Digital Feedback in the Research Planning Process

Peers, Pedagogies, and Technologies

Jennifer Schluer

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Foreword and Acknowledgments

When I was first asked to conduct a research colloquium for Master students, the Covid-19 pandemic had just begun. At that time, digitalization was not only a necessity but also appeared to be valuable for supporting students' research planning and academic writing process.

Based on my initial experimentation with online teaching in spring 2020, I became aware of the existing challenges and potential improvements. Consequently, I started to draft a new course design and applied for funding to make its implementation possible. Luckily, upon first try, I received a "Digital Fellowship" by the Saxon State Ministry for Science, Culture and Tourism (*Sächsisches Staatsministerium für Wissenschaft, Kultur und Tourismus*, SMWK) for my project "DigiFeed – Digital feedback to help you move forward in your academic career" from 07/2021-12/2022). Their financial support is gratefully acknowledged, as it helped to conduct a literature review on digital feedback methods and to utilize them in teaching. Special thanks go to the DigiFeed student assistants Shanqing Gao, Jo-Luise Fröhlich and Sepideh Javdani Esfahani, as well as to the participants in the first round of the "TESOL Research Colloquium" (TRC).

This new course design seemed beneficial, but participants' perceptions and its impact had not been researched systematically in this first exploration. I therefore applied for additional funding to investigate its effectiveness, refine the design, and derive suggestions for further improvement. In that regard, I would like to express my gratitude to the *Stiftung Innovation in der Hochschullehre* for providing funding for the project "Didaktische Orientierung für digitales Feedback (Pedagogical guidance for using digital feedback): Digital Feedback Map (DFM)" (project ID: FRFMM-181/2022, project duration: 09/2022-11/2023). Likewise, I direct my deepest thanks to the DFM project staff, notably Natalie Bleyl and Shanqing Gao, for their valuable assistance in the preparation and analysis of the research data. Moreover, I would like to thank the student assistants Ezgi Irem Bekci, Erhan Altay and Merve Cakici for their support in the search for literature and in the creation of manuals and video tutorials. Furthermore, I want to extend my gratitude to all participating students who made this research possible.

Not only the Digital Feedback conference that I hosted in June 2023, but also further project communication helped to attract wider attention to the digital feedback design that I had created. Owing to its transdisciplinary relevance, I applied for a "Digital Transfer Fellowship" in early 2024, together with my project partner Prof. Dr. Monique Meier from the natural sciences (chair of Didactics of Biology at Dresden University of Technology, Germany). We conducted a transdisciplinary transfer project called "Digital feedback dialogue to support teaching and learning processes in the Humanities and Natural Sciences" from April till November 2024 ("Transfer transdisziplinär: Digitaler Feedbackdialog zur Unterstützung von Lehr- und Lernprozessen in den Geistes- und Naturwissenschaften"). The project was funded by the Saxon State Ministry for Science, Culture and Tourism, and resulted in the creation of a German-language version of the Digital Feedback Map (Schluer, 2024c) and of the interactive feedback taxonomy (Schluer, 2024e), the organization of interdisciplinary symposia and workshops as

well as a project publication (Schluer & Meier, to appear). The present book, however, concentrates on the data gained from the original DFM project conducted in the TESOL Research Colloquium (TRC) and addresses avenues for new modifications in the discussion section.

Given the innovative student-centered design of the TRC and its highly successful implementation in heterogeneous teaching contexts, I received the award for excellent teaching (*Lehrpreis für herausragende Lehre*) from Chemnitz University of Technology (*Technische Universität Chemnitz*) in November 2024, an honor which I gratefully acknowledge.

Finally, I'd like to thank the open access team of *Universitätsbibliothek Chemnitz* (Chemnitz University Library) and *Technische Universität Chemnitz* for financially supporting the publication of this book in open access format.

About the Author

Dr. Jennifer Schluer is Assistant Professor for Teaching English to Speakers of Other Languages (TESOL)/ Advanced Academic English at Chemnitz University of Technology, Germany. She specializes in English language teacher education with a focus on digital teaching and digital feedback methods, academic writing and reading comprehension as well as language awareness, multilingualism and culture learning. Her textbook about *Digital Feedback Methods* was published in 2022, while her edited volume on *Digital Feedback in Higher Education: Teaching Practices, Student Voices, and Research Findings* appeared in 2024. In the same year, Dr. Schluer received the award for excellent teaching from her university.

Book Summary

The book "Digital Feedback in the Research Planning Process: Peers, Pedagogies, and Technologies" offers a comprehensive exploration of how iterative, dialogic peer review supports academic inquiry at Master's and doctoral levels. To capitalize on participants' heterogeneity, the pedagogical design integrates peer scaffolding within an inquiry-based, inverted classroom approach that is situated in an open, digitally mediated feedback environment. Drawing on empirical data from the TESOL Research Colloquium, this study investigates three asynchronous digital feedback formats – cloud-based digital boards, recorded audio(visual) files, and online forum exchanges – across successive phases of research planning, from topic generation to proposal presentation. The triangulation of student perceptions, feedback analyses, and course evaluations confirms the efficacy of the pedagogical design while highlighting the need for redefined roles of students and supervisors, targeted training in (pro)active feedback exchanges, and strategic tool selection based on communicative affordances. Rich with practical suggestions and transferable frameworks, this book equips teacher educators and researchers with actionable insights to promote student agency, peer learning, and the competent use of digital technologies – including artificial intelligence – in higher education.

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1. Introduction

Effective feedback is essential to support the learning process, especially in highly complex and demanding tasks, such as the preparation of a research project and the writing of an academic thesis. The thesis as the culminating academic task is central for successful graduation (Grohnert et al., 2024, p. 1) and serves as a "bridge from the world of study to the world of scholarship" (Ylijoki, 2001, cited by Neupane Bastola & Hu, 2023, p. 1; cf. T. Wang & Li, 2011, pp. 101–102). For many students, the Master thesis reports on the first independent research project that they had conducted over an extended period of time, typically spanning six months or more (as reviewed by Grohnert et al., 2024, p. 2). To create this final product, novice scholars must acquire a wide range of competencies and overcome various challenges of their research journey. In this process, they need to complete several steps and develop specialized competencies, including the search for and delimitation of a researchable topic, the synthesis of scholarly literature, the crafting of suitable conceptual, pedagogical and methodological frameworks (Neupane Bastola & Hu, 2023, p. 5), the development of independent research skills in data collection, analysis, critical reflection and interpretation as well as in time management, problem-solving and mastering academic genres for presenting their findings in oral and written ways (cf. K. Hyland, 2009; Lei & Pramoolsook, 2020, p. 166; Millin et al., 2022, p. 233).

Accordingly, thesis supervision is a cornerstone of graduate and postgraduate education. Within this context, feedback plays a pivotal role in guiding students through the complex and often unfamiliar terrain of research planning and thesis writing (cf. Grohnert et al., 2024, p. 2). In this respect, feedback can be considered as a form of "advanced academic training" (Kumar & Stracke, 2007, p. 462) or "hands-on coaching within a wider context of reflective practice" (M. Pearson & Brew, 2002, p. 141) and thus as a "major source of supervisees' learning and improvement" (Gezahegn & Gedamu, 2023, p. 1). Despite its importance and the increasing numbers of students striving for a Master degree (statistics reviewed by Grohnert et al., 2024, p. 13), empirical evidence on thesis supervision and effective feedback processes in research planning and academic writing is limited. This particularly pertains to peer feedback in digitally mediated learning environments at postgraduate level. Indeed, recent reviews have shown that teachers' text-based feedback on written assignments still represents the most common feedback direction and format in higher education (Kurt & Karabulut, 2024, p. 4, preprint; Thennakoon, 2023, p. 2). Given the high numbers of thesis writers, supervisory feedback is often characterized by brief corrective comments (Pachuashvili, 2024, p. 227) provided in a unidirectional manner (Schluer, 2021b, p. 160; 2023b, p. 2).

Moreover, as independent research is often considered a solitary process, there hardly exist any structured ways to foster peer support in postgraduate education. Consequently, thesis writers frequently rely on occasional feedback by their supervisors, even though peer feedback might not only fulfil social and motivational purposes, but could also advance the research

process on cognitive and metacognitive dimensions (see overview in Schluer, 2022a, p. 39). By experiencing and reflecting on feedback from the perspectives as producers and recipients, students could profit from peer review in numerous ways, particularly in teacher education where it can serve as a model for their own future teaching. Additionally, with the increasing digitalization, new opportunities for feedback exchanges are enabled that require critical reflection and examination.

The present book therefore examines the use of digital feedback methods in one of the most crucial phases of academic studies in higher education, which is the planning and writing of the Master thesis or doctoral dissertation. Specifically, it responds to five major gaps in the field: (1) the limited focus on peer feedback as compared to instructor feedback, (2) the narrow range of assignment types under investigation, (3) the underutilization of alternative, especially digital, feedback methods, (4) the lack of attention to feedback as a dialogic and student-centered process, and (5) the insufficient analysis of how feedback varies across tools and modes in relation to learner perceptions in their roles as feedback providers and recipients.

Against this background, the present study seeks to explore peer feedback perceptions and practices via different digital media at successive stages of the research planning process. Data were collected in the TESOL Research Colloquium (TRC), a course designed to support Master and (aspiring) doctoral students in planning individual research projects within the field of Teaching English to Speakers of Other Languages (TESOL). More precisely, the colloquium guides participants through key phases of their research journey, such as formulating research questions, selecting appropriate research methods, and presenting their research in written and multimodal ways. Given the heterogeneity of the participants, who differ in their academic backgrounds, teaching experience, linguistic and cultural profiles as well as thematic interests, the course intends to capitalize on this diversity by adopting a peer learning approach. More specifically, the TRC aims to foster collaborative learning culture within an open feedback environment (cf. Wood, 2019), where students continuously share their progress and exchange feedback. To this end, the colloquium integrates various digital tools for synchronous and asynchronous feedback, including cloud-based digital boards, recorded feedback (audio, video, screencast), online forums, and videoconferences. In that regard, the study examines the ways in which students exchange and evaluate digital peer feedback in three different formats and research phases: (1) peer feedback on cloud-based digital boards for finding and refining a research topic, (2) digitally recorded peer feedback (audio, video, screencast) to develop a research design and outline, and (3) peer feedback in online forums to comment on students' screen-recorded project presentations.

By examining feedback practices and perceptions, the study seeks to enhance the pedagogical design of research support in higher education. It is situated within a larger project —

Pedagogical Guidance for Using Digital Feedback[1] — which explores the didactic potential of feedback technologies in promoting collaboration and learner agency, increasing teaching quality, and tailoring support to individual needs (Schluer, 2024h). In doing so, the study extends prior research by considering feedback not merely as a corrective mechanism, but as a dynamic and pedagogically embedded dialogic practice that enhances student learning, digital literacy, and professional development.

To achieve these aims, the book consists of six parts and is structured as follows: Chapter 2 provides a conceptual and empirical review of digital peer feedback in research planning and academic writing to situate the current study within existing scholarship. To begin with, it sketches the contemporary conceptualization of feedback as a dialogic practice (sections 2.1 and 2.2) and outlines the potentials of peer feedback (section 2.3). Subsequently, section 2.4 summarizes prior research on feedback in thesis supervision while discussing the roles of students and supervisors, feedback functions and contents, as well as linguistic and cultural factors that can influence students' engagement with and responses to the feedback they obtain. Next, section 2.5 presents different phases of the research planning and academic writing process to build a foundation for the pedagogical planning of the feedback intervention in the current study. In that regard, section 2.6 characterizes different digital feedback methods that were employed in the present work.

To address the research gap and answer the resultant research questions (see section 2.7), chapter 3 provides details on the methodological design. This includes general considerations about pedagogical design (section 3.1) as well as information about the specific approaches that were adopted in the current intervention. Notably, this involves inquiry-based learning (section 3.2) and the establishment of an open, digitally mediated feedback environment (section 3.3). Afterwards, section 3.4 elaborates on the assignment types and feedback procedures that were applied in the different phases of research planning. Moving from pedagogical considerations to the empirical design of the study, the following sections inform the readers about the research context and target population (section 3.5), the research approach (section 3.6), instruments and data sources (section 3.7) as well as assumptions and hypotheses that were advanced prior to data collection (section 3.8). The subsequent sections 3.9 and 3.10 describe the analytical procedure, along with considerations about validity and reliability (section 3.11).

Next, the comprehensive chapter 4 presents the findings for the three feedback formats and research phases in a detailed manner. It starts with an overview of the data corpus (section 4.1) and background information about the participants (section 4.2). The ensuing presentation of results is divided into three major parts. First, sections 4.3 to 4.5 focus on the specific results

[1] The project "Didaktische Orientierung für digitales Feedback (Pedagogical guidance for using digital feedback): Digital Feedback Map (DFM)" was funded by the *Stiftung Innovation in der Hochschullehre* (project ID: FRFMM-181/2022, project duration: 09/2022-11/2023).

obtained from the three formative surveys, followed by a brief intermediate summary of the survey results in section 4.6. Second, sections 4.7 to 4.9 concentrate on the findings from the feedback analyses of the digital boards, recorded files, and online forums, respectively. Each of these sections contains an overview of the codings as well as detailed results of the feedback characteristics, contents, structures and purposes, their linguistic, non-verbal and technological features as well as observable follow-up interactions and (cross-)references. Based on this elaborate presentation of the feedback products in the separate phases, section 4.10 offers a comparative analysis along these central dimensions. Finally, in the third part, results from the summative course evaluation survey will be presented (section 4.11) and compared to previous years that did not yet incorporate the present pedagogical design (section 4.12).

After this extensive presentation of findings from the survey and the feedback analyses, chapter 5 begins with a structured summary of results in response to the four major research questions (section 5.1), along with a joint consideration across the different feedback formats (section 5.2). Immediately afterwards, section 5.3 compares the key findings from the current research to preceding studies, concentrating on the roles of peers, technologies, and pedagogies. Building on the limitations of the present work (see section 5.4), sections 5.5 and 5.6 will showcase the planned modifications in research design and suggest additional options for the empirical investigation of digital feedback in the research planning process. The remaining sections of the discussion chapter will offer empirically grounded recommendations for future teaching practices as well as additional practical suggestions, including possible variations of digital feedback methods, such as the incorporation of artificial intelligence (AI) in the research and writing process (section 5.7). These changes in pedagogical design require a willingness to engage in continuous professional development, which is why section 5.8 shifts attention to peer feedback among teachers or thesis supervisors, participatory pedagogies as well as participatory research.

Finally, the concluding chapter 6 will present closing remarks and set the stage for follow-up work in higher education research and teaching. Overall, this book thus intends to offer insights for researchers, educators, and program designers alike, who are open to engage with feedback as a pedagogically meaningful and technologically supported practice. In particular, it advocates for a shift toward dialogic, learner-centered feedback cultures in higher education — cultures that recognize the complementary roles of peers, pedagogies, and technologies in fostering academic development.

2. Literature Review

The concept of feedback has evolved over time and has been shaped by scholarly and pedagogical work in numerous disciplines (see e.g. reviews by Nieminen et al., 2022, pp. 99–104; Schluer et al., 2023). Accordingly, there is a great diversity of practical applications (see review by Brück-Hübner & Schluer, 2023; Schluer & Brück-Hübner, 2025) and individual understandings of this notion. The next sections therefore outline the conceptualization of feedback and feedback literacy that informed the present research (sections 2.1 and 2.2). With its dedicated focus on peer feedback, the subsequent section 2.3 will carve out several benefits and associated challenges, resulting in specific training needs to foster reciprocal learning. Despite its many affordances, peer feedback has hardly been incorporated and investigated in the realm of research planning and thesis supervision. Instead, thesis writing has mostly been considered a solitary process in higher education which is mainly dependent on occasional feedback by the supervisor. Section 2.4 therefore synthesizes prior research on supervisory feedback in the research planning and writing process, discusses underlying models of student and teacher roles and reviews several factors, such as feedback functions and contents, linguistic and cultural aspects as well as different engagement dimensions that influence the feedback process and uptake. Since the current research aims to examine peer feedback exchanges at diverse phases of the research planning process, the ensuing section 2.5 briefly characterizes the different stages. Even though digital tools enable multimodal communication in unprecedented ways, their potentials for facilitating peer feedback at different stages of the research process have been underexplored. Section 2.6 therefore defines those digital feedback methods that will be examined in the present work. Given the paucity of relevant previous work on digital peer feedback in research planning, the chapter will close by specifying the research questions that the empirical part seeks to answer (section 2.7).

2.1. Conceptualization of Feedback

Due to its high impact on learning success (see e.g. Hattie, 2009; Wisniewski et al., 2020), feedback has gained substantial attention in educational contexts. Over time and across disciplines, research studies and scholarly discourse have led to a variety of definitions, principles, frameworks, and understandings (Coppens et al., 2025, p. 173; Matthews et al., 2024, p. 26; Nieminen et al., 2022, pp. 99–104; cf. the review by Schluer et al., 2023). It has hence been understood through various theoretical lenses, including information transmission, social constructivism, socio-material perspectives and ecological approaches, each offering different insights into how feedback processes might work (Lu et al., 2024, p. 2; Schluer, 2022a, p. 16).

Nowadays, **feedback** is increasingly conceptualized as a dynamic, interactive and multidirectional process in contextually rich and situated learning ecologies (Deehan et al., 2023, p. 2) instead of a simple one-way transmission of information from experts (teachers) to

learners (e.g. Carless, 2022; see also the review by Schluer, 2022a, p. 16). In line with the general educational discourse, a shift from teacher-centered to student-centered approaches has thus occurred (Carless, 2022), with an emphasis on what learners need rather than what teachers do (Soltani & Zhang, 2025, p. 425; cf. Brück-Hübner, 2024). This change positions students as (pro-)active agents in the feedback process seeking to enhance their learning (Carless & Boud, 2018; Molloy et al., 2020). Since feedback involves interactive exchanges, it has been argued that feedback givers and receivers need to adopt different but shared responsibilities to make feedback processes successful (cf. e.g. Nash & Winstone, 2017; L. Yang, 2021, p. 67). Scholars therefore drew attention to the "relational dynamic[s]" (Matthews et al., 2024, p. 27) and principles of reciprocity that need special consideration within co-created interaction spaces. Accordingly, contemporary frameworks emphasize feedback processes as dynamic, dialogic and iterative in which learners play an active role by eliciting, providing, processing, and using feedback (Carless & Boud, 2018) during interactions with teachers, peers, technologies as well as other people and resources. This understanding complies with socio-constructivist and socio-material approaches (Chong, 2021; 2022; Gravett, 2022).

Socio-constructivist approaches emphasize the co-construction of knowledge through dialogue, reflection, collaboration and negotiation (cf. Carless & Young, 2024, p. 9; Price et al., 2011, cited in Carless, 2019, p. 705; see also Brück-Hübner, 2024, p. 102) and view feedback as essential to self-regulated learning (Malecka et al., 2022, p. 911) and competence development. Key concepts in that regard are "learner agency and pro-activity", as "feedback is only taken up when students perceive themselves as agents of their own change" (Carless & Young, 2024, p. 3). Agency in this context refers to "the degree to which learners are able to make purposeful decisions in the feedback process" (Deehan et al., 2023, p. 2). Accordingly, from a socio-constructivist frame, feedback is understood as an interactive "process through which students make sense of performance-relevant information and use it to develop their work and/or their learning strategies" (Carless & Young, 2024, p. 2; cf. Soltani & Zhang, 2025, pp. 427–428).

These feedback (inter-)actions are entangled in a complex web of factors, as captured by **ecological** systems theory (originally developed by Bronfenbrenner, 1977, 1979, and applied to feedback encounters by Ajjawi et al., 2017; all sources cited in S. Chen & Nieminen, 2024, pp. 694–695). It comprises

- the immediate micro-system of the feedback encounter;
- the meso-system of, e.g., the classroom (including pedagogical feedback designs);
- the exo-system of classroom-external social settings, such as feedback culture in the family;
- the macro-system of broader institutional, sociocultural, -political and -economical influences;

- the chrono-system of timescapes, such as students' previous feedback experiences and transitions to new contexts (Ajjawi et al., 2017, quoted by S. Chen & Nieminen, 2024, p. 695).

As each of these systems influences the ways in which feedback exchanges (can) occur, they must be carefully considered in interventions that aim to foster feedback literacy (see section 2.2). Clearly, then, feedback processes are not just individual and (meta-)cognitive in nature, but also social, relational and emotional (Carless & Young, 2024, p. 8) as well as situated and dynamic. Relationship-building and trust are therefore crucial for effective feedback uptake (cf. Carless & Young, 2024, p. 8; Sato & Ballinger, 2012, pp. 172–173). This includes the creation of a positive and supportive learning environment (as reviewed by S. Chen & Nieminen, 2024, p. 702), characterized by trust between students and teachers as well as among peers. Moreover, learners' perception of the trustworthiness of information provided by digital tools (cf. Schmied, 2023) and other media (e.g. websites, videos, books) can have an impact on their learning.

Consequently, **socio-material perspectives** on the feedback process have been developed, which consider the roles of media and materials more profoundly (Chong, 2021; 2022; Gravett, 2022). From the sociomaterial standpoint, feedback must be understood within the specific digital environments in which it occurs, which means recognizing its interactions with individual, interpersonal, sociocultural, affective and situational factors (see the review by Schluer & Liu, 2024; cf. Tai et al., 2023, p. 201). Therein, tools and technologies not only enable but also constrain feedback practices (Tai et al., 2023, p. 202), for instance regarding learners' agency in feedback seeking, provision, processing and utilization (Nieminen et al., 2022, p. 95; cf. Laflen, 2023, p. 2; Kurt & Karabulut, 2024, p. 21, preprint). Thorne (2016), for example, found that learners' engagement with, preference for and utilization of particular tools is also affected by their perception of the tool features, which in turn can be shaped by personal and sociocultural factors and thus promote or inhibit communicative exchanges. It is therefore essential for the feedback participants to become aware of tool limitations and affordances so that they can exploit digital tools in an appropriate manner and reconfigure learning spaces through negotiation (cf. Schluer & Liu, 2024, p. 126). In educational contexts, it is consequently crucial to foster students' reflection on how tools and technologies shape their feedback exchanges, as will be attempted in the current study (see especially the formative surveys in section 3.7). Likewise, a thorough examination of how learners engage with feedback through their linguistic, cultural, and modal repertoires for particular learning tasks within specific socio-material environments is needed to derive recommendations for their effective use.

Interpersonal exchanges and interactions with media are thus influenced by affective, linguistic, cultural, and other contextual variables (Schluer & Liu, 2024). Instead of regarding these factors as hindrances to feedback processes and uptake, they should be "recognized as resources and assets" (Soltani & Zhang, 2025, p. 425). Certainly, this requires manifold skills

from the feedback participants who need to be united in their efforts to advance learning. The collaboration can occur through the negotiation of meanings and ideas (Soltani & Zhang, 2025, pp. 440–441), the co-creation of communication rules and feedback principles, as well as regular reflections on the usefulness and efficacy (Schluer & Liu, 2024, p. 141). Feedback is thus "a dynamic process" (Gan et al., 2025, p. 279) that depends on the feedback literacy of all interactants, as will be further explained below.

2.2. Feedback Literacy

Feedback literacy is a fundamental asset for the teaching and learning process and can hence be profitable for both sides. According to current conceptualizations, the notion includes two key dimensions: student feedback literacy, where learners actively seek, comprehend, and apply feedback (Carless & Boud, 2018, p. 1316), and teacher feedback literacy, where educators create supportive learning environments that facilitate effective feedback interactions and help students develop self-regulation skills (Boud & Dawson, 2023; Carless & Winstone, 2023, p. 153). Increasingly, however, there is a call to move beyond binary distinctions between student and teacher feedback literacy, so to recognize their shared responsibilities and interactions in the feedback process (Schluer et al., 2023, p. 156). In the end, the development of feedback literacy can flourish from collaborative efforts among various social agents who participate in the joint creation of knowledge and understanding (cf. Soltani & Zhang, 2025, p. 440). It thus involves openness and learning from all participants in a co-created social interaction space mediated by materials, (digital) tools as well as agents' identities, communicative resources and strategies (e.g. language use, feedback skills, cultural factors). Simultaneously, this framework seeks to break down dominant power structures (Schluer et al., 2023, p. 159) for which peer feedback (section 2.3) and assessment co-design through pedagogical partnerships (section 5.8.3) can fulfil important functions. To lay a theoretical foundation, the notions of student feedback literacy and teacher feedback literacy will be elaborated in the next paragraphs before the focus will be shifted to peer feedback.

Generally, the concept of **learner feedback literacy** foregrounds student agency in the feedback process, not only to improve the current task, but also to develop self-regulatory strategies for future learning (as reviewed by Carless & Young, 2024, p. 2). Elaborating on the work by Sutton (2012), Carless and Boud (2018) defined feedback literacy as "the understandings, capacities and dispositions needed to make sense of information and use it to enhance work or learning strategies" (p. 1316). More precisely, it involves "appreciating the value of feedback; seeking and generating feedback; sense-making of feedback information; […] develop[ing] […] capacities in making academic judgments; working with emotions;" and taking actions for feedback uptake (Carless & Boud, 2018, cited by Carless & Young, 2024, p. 3).

To capture the learner perspective more profoundly, Molloy et al. (2020) analyzed learners' views and proposed a learning-centered feedback literacy framework which encompasses

seven interrelated dimensions (p. 538). Each of these dimensions is complex in nature, with some key aspects highlighted below. Overall, the framework can be used for course planning (Molloy et al., 2020, p. 536) and for guiding students in actively engaging with and utilizing feedback to improve their learning strategies and outcomes. The authors also emphasized the importance of introducing feedback-related strategies early in the curriculum (Molloy et al., 2020, p. 537; see also Schluer, 2024i) to progressively develop students' feedback literacy.

First, students are encouraged to commit to feedback as a tool and catalyst for continual improvement by developing a mindset that sees feedback as essential for growth (Molloy et al., 2020, p. 530; cf. growth mindset by Dweck, 1999, cited in Nicol & Macfarlane-Dick, 2006, p. 212). Second, the framework emphasizes the importance of "appreciat[ing] feedback as an active process" (Molloy et al., 2020, p. 530). In that regard, learners need to recognize their responsibility for identifying their own learning needs (Molloy et al., 2020, p. 530) and proactively resort to suitable resources. This includes, for example, "'early' feedback loop[s], by seeking advice from peers and making refinements before submitting assignments" (Molloy et al., 2020, p. 534). Moreover, they should continuously take opportunities to refine their evaluative judgment over time (Molloy et al., 2020, p. 530). Overlapping with this dimension, the third one focuses on students' elicitation of information, where learners are expected to proactively seek feedback from a variety of sources, such as peers, teachers, or others (Molloy et al., 2020, p. 531). They should learn to engage in meaningful dialogue to clarify expectations and standards while considering a multiplicity of perspectives (Molloy et al., 2020, p. 531). Next, the fourth dimension, processing feedback (Molloy et al., 2020, p. 531), highlights the need for students to critically analyze the received information, to extract actionable insights and apply them effectively to enhance their work (Molloy et al., 2020, p. 532).

The fifth dimension, in turn, addresses emotional aspects of feedback, which can affect information processing and interpersonal relations in manifold ways (see also S. Chen & Nieminen, 2024, p. 693). The dimension comprises students' openness towards receiving (critical) feedback as well as volition to engage with the information and continue the learning dialogue as needed (Molloy et al., 2020, p. 532). It includes managing emotional challenges, which might arise from the communication style of the persons and the media involved in the feedback process (Molloy et al., 2020, p. 533). Indeed, prior research has produced mixed findings about the role of emotions, as they are shaped by personal histories, cultural aspects, interpersonal relations and situational factors (S. Chen & Nieminen, 2024, pp. 693, 705). On the one hand, critical feedback can threaten students' self-image and motivation as well as interpersonal relationships and their perception of the value of feedback in general (as reviewed by Carless & Young, 2024, pp. 2, 6, 9). On the other hand, positive feedback might cause dissatisfaction among those students who are eager to improve, whereas others consider it as important for developing confidence and motivation (Hui et al., 2024, p. 343). It has been argued that trust-building in a supportive learning atmosphere is crucial to recognize the benefits of both positive and

negative feedback (cf. the review by S. Chen & Nieminen, 2024, pp. 702–703). For instance, a student in the research by Carless and Young (2024) developed her capacity "in turning self-criticism or teacher critique into driving forces for feedback uptake" (p. 10). As the authors explained,

> "over time [she] perceived value in feedback information that she had previously downplayed, evidencing development in the dimension of appreciating feedback. She developed enhanced emotional equilibrium in responding to critical feedback, perceiving it more as a potential for growth and less as an indicator of flaws." (Carless & Young, 2024, p. 10)

In the end, also teachers' emotions might affect "students' emotions in feedback encounters" (S. Chen & Nieminen, 2024, p. 706), thus necessitating an open and trustful interaction space (p. 702). Especially when students transition from one classroom context (or even one academic culture) to another, they are likely to face differences in the learning and feedback culture (S. Chen & Nieminen, 2024, p. 704). To avoid or resolve emotional barriers as well as clarify expectations, feedback training for students and staff becomes crucial (cf. the review by S. Chen & Nieminen, 2024, p. 703).

Proceeding to the sixth dimension of Molloy et al.'s (2020) framework, we find that the reciprocity of the feedback process needs to be recognized by the learners (p. 533). They should be guided to understand and feel comfortable in their complementary and mutually supportive roles as both receivers and providers of feedback (Molloy et al., 2020, pp. 533, 536). The ability to engage in feedback dialogues also requires sensitivity to relational dynamics as well as cultural aspects to reach deeper learning (Molloy et al., 2020, pp. 533, 536). Finally, the seventh dimension focuses on enacting the outcomes of feedback provision (Molloy et al., 2020, p. 533). This involves setting goals, recording and analyzing feedback information, planning to apply feedback in future tasks, as well as continuously monitoring progress and subsequently setting new objectives (Molloy et al., 2020, p. 534). By doing so, students may realize the complexity of the feedback process, which not only comprises the feedback event itself, but also preparatory stages and follow-up actions (Molloy et al., 2020, p. 536; see also seventh dimension in the feedback taxonomy by Schluer & Brück-Hübner, 2025). In the end, this may help to ensure that feedback is used for long-term improvement rather than seen as a one-time intervention.

Similar to the notion of feedback literacy, the concept of "feedback orientation" has been in use (Coppens et al., 2025, p. 176). It was "defined by London and Smither (2002, p. 81) as 'an individual's overall receptivity to feedback, including comfort with feedback, tendency to seek feedback and process it mindfully, and the likelihood of acting on the feedback to guide behaviour change and performance improvement'" (as quoted in Coppens et al., 2025, p. 176). It appears to foreground agents' attitudes and perceptions towards feedback and their roles in the feedback process, which is likely to influence their engagement and feedback use (cf. L.

Yang, 2021, pp. 69–70). For example, the "Feedback Orientation Scale" (FOS) (Linderbaum & Levy, 2010, cited by Coppens et al., 2025, p. 175) includes dimensions such as utility ("belief in the usefulness of feedback"), accountability ("a sense of responsibility"), self-efficacy ("confidence in one's capability"), and social awareness ("consciousness of others' perspectives") (Coppens et al., 2025, p. 176). Accordingly, the current study will also set a focus on collecting students' perceptions towards feedback and digital tools via three formative and a summative questionnaire.

Furthermore, regarding the different steps in the feedback process, Brück-Hübner (2024, p. 103) suggested a four-phase model from the lens of interactive constructivism (drawing on Reich, 2007; 2010), which foregrounds learners' active engagement and responsibilities across all phases. First, in the initiation phase, it is ideally the learner who initiates the feedback process, but if started by the instructor, the student's willingness to engage is key (Brück-Hübner, 2024, p. 103). Second, in the communication phase, feedback is exchanged, negotiated and clarified to ensure understanding (p. 103). Third, in the reflection and construction phase, learners reflect on the feedback and seek to integrate it with their prior knowledge, beliefs and strategies to derive meaningful conclusions and pave the way for practical application (p. 103). Fourth, the transfer phase is characterized by taking actions and executing the transfer (p. 103). Hence, learners apply the feedback to similar situations and continue the feedback cycle for ongoing improvement or restart the feedback loop as needed (Brück-Hübner, 2024, p. 103), which underscores the iterative nature of the feedback and learning process (Carless & Young, 2024, p. 7).

Rather than feedback loops, it might make sense to speak of "feedback spirals", as suggested by Carless (2019), given the complexities of feedback uptake and learning (Carless & Young, 2024, pp. 7–8). The notion emphasizes the ongoing, developmental nature of learning, i.e. it underscores the temporal dimension to facilitate continuous improvement and a "longer-term engagement" (Carless, 2019, p. 712). Consequently, teachers should design curricula "in spiral sequences" (Carless, 2019, p. 713) that allow for an ongoing development of feedback literacy and learning (cf. Malecka et al., 2022). This includes, for example, "iterative cycles of tackling assignments, engaging with feedback, reflecting and making ongoing adjustments" (Carless, 2019, p. 713). Staged assignments, in which information and insights gained from a foregoing task can be used for the next one, appear to be particularly valuable for that purpose (Carless, 2019, p. 707). In fact, this pedagogical design principle has been adopted in the present study in which one assignment fed into another and was linked through feedback exchanges in different media and modes (see section 3.4).

These considerations also underline that the development of students' feedback literacy and their learning success are closely connected to **teachers' feedback literacy**, especially skills in course and task design (e.g. Carless & Winstone, 2023, on the interwoven nature of teacher and student feedback literacy). Accordingly, in many publications, teachers are

expected to "set the stage for feedback by creating the educational conditions to foster the development of student feedback literacy" (Matthews et al., 2024, p. 27; see also Frattarola et al., 2024, pp. 1–2). Ideally, feedback should be considered "as an integral part of their course designs" (Esterhazy, 2019a, p. 64), which "involves planning and coordinating feedback activities to facilitate proactive and multidirectional feedback exchanges, as well as fostering reflective and effective feedback utilization" (Schluer, 2024j, p. 283, with reference to Boud & Dawson, 2023, p. 158). This demands an appropriate matching of tasks and feedback methods (Carless & Winstone, 2023, p. 154) as well as distributed responsibilities among teachers and learners (Esterhazy, 2019b, pp. 74–75). This shared responsibility between students and teachers (e.g. Nash & Winstone, 2017) is rooted in a social-constructivist view, where teachers establish feedback opportunities that help students build connections and knowledge by actively requesting, engaging with and applying feedback (Malecka et al., 2022, p. 911; cf. Carless & Boud, 2018, on student feedback literacy).

While the range of recommended practices for teachers has grown over time (e.g. Boud & Dawson, 2023; Schluer, 2022a; 2024b; Winstone & Carless, 2020, p. 170), a more compact model has been suggested by Carless and Winstone (2023). Their model of teacher feedback literacy consists of three layers, i.e. design, relational, and pragmatic dimensions (see also Carless, 2022, p. 145). First, the design dimension emphasizes the creation of activities that help learners understand and value feedback (Carless & Winstone, 2023, p. 154). It involves considerations about the timing, tools and feedback directions as well as the training and coaching of the feedback participants. Ideally, there is a concertation of feedback tasks at micro-, meso- and macro-levels of the educational system (Boud & Dawson, 2023). Similarly, the "4M" model stresses that feedback literacy needs to be developed at micro-, meso-, macro- and mega-levels, ranging from individual to curricular and broader societal contexts (as reviewed by Moya & Eaton, 2023, pp. 6–10; Schmohl et al., 2023, pp. 10–11). Second, the relational dimension addresses emotional challenges that arise from sociocultural and interpersonal but also technological factors (Carless & Winstone, 2023, p. 155). It necessitates approachability as well as support in emotion and relation management before, during and after feedback exchanges. In that respect, it is foundational to create a feedback culture of mutual trust in which responsibilities are shared and learning partnerships established. It also needs to be explored in how far the utilization of technologies could strengthen or impede interpersonal relations. Third, the pragmatic dimension considers personal (e.g. time investment) and external (e.g. institutional) constraints (Carless & Winstone, 2023, p. 156). While it is often argued that the use of technologies can increase efficiency, their competent utilization also presupposes familiarity with their features and training in their functions, which, however, may pay off in the end. Overall, then, contextual factors can influence feedback interactions in numerous ways.

Even though the model of teacher feedback literacy is grounded on the principle of responsibility-sharing, it has been criticized for maintaining fixed roles for learners and teachers

(see the review by Y. Liu, 2024, p. 64). Schluer et al. (2023) argued that it might perpetuate the unequal power dynamics between the two groups of agents, thus contradicting its aim to deconstruct the traditional dominance of teachers in feedback processes (p. 158). Tai et al. (2023) further criticized the framework for reinforcing teachers' control over feedback processes and contents, putting learners in a rather passive role (p. 206). Consequently, it seems as if the model does not fully promote learner agency in the feedback process, but instead reinforces conventional power structures. A different approach can be realized through pedagogical partnerships, where students and teachers collaborate in the pedagogical planning and evaluation of feedback processes (cf. Chan & Chen, 2023; Cook-Sather et al., 2014; Cook-Sather & Matthews, 2021; Smith et al., 2024; see section 5.8.3). In fact, collaborative learning can take place in multiple ways, with varying levels of agency on the students' side. Peer feedback and partnership in assessment processes are two possible options, placing different demands on the students while seeking to enhance their engagement and sustainable learning (see Schluer, accepted). The present research will concentrate on peer feedback as a specific variant of collaborative learning that can be conducive for sustainable self-regulatory practices (see next section 2.3 for details).

Carless et al. (2011) defined **sustainable feedback** as "dialogic processes and activities which can support and inform the student on the current task, whilst also developing the ability to self-regulate performance on future tasks" (p. 397). In terms of pedagogical design, Fastré et al. (2013) underscored the principles of "modeling, coaching and scaffolding" (p. 621) based on the cognitive apprenticeship model by Brown, Collins, and Duguid (1989). Modeling involves students observing expert task performance to understand quality standards and performance targets (Fastré et al., 2013, p. 621). Coaching, in turn, means providing targeted feedback on students' task performance to enhance their skills (Fastré et al., 2013, p. 621). Finally, scaffolding ensures that teacher support decreases gradually to foster learners' ability to perform tasks independently (Fastré et al., 2013, p. 621). These methods collectively guide learners in developing sustainable skills by incrementally transferring responsibility from teachers to students (Fastré et al., 2013, p. 621). Additionally, practice must be complemented by reflective dialogue and discussion to refine students' understanding and use of assessment criteria (Fastré et al., 2013, p. 624). This can also help to form "communities of judgement" as a special type of "communities of practice" (Boud, 2010b, cited in T. T. Nguyen & Walker, 2016, p. 100). The next section will discuss peer feedback and peer feedback training in more detail based on a review of prior literature.

2.3. Peer Feedback

The previous section identified teacher and student feedback literacies as two interlocking sets of skills required for successful and ideally sustainable feedback exchanges. The present work argues that peer approaches could raise students' awareness of both perspectives in an

integrated manner, as the participants need to take on both roles. They thus experience the challenges, benefits and effects of their actions along the different phases of the feedback process, including feedback seeking, reception, production, and use. Framed within the context of teacher education, a systematic integration of peer feedback into courses can be particularly valuable for future teachers, since it helps them to shift between and reflect on learner and teacher perspectives. The following subsections will define peer feedback, outline its possible advantages and underscore the need for sufficient training to maximize its effects.

2.3.1. Definition of Peer Feedback

Peer feedback can be considered as a special type of collaborative learning that focuses on reviewing and commenting on each other's learning products and progress (cf. A. S. Alharbi, 2025, p. 6; Falchikov, 2001, cited by van den Berg et al., 2006, p. 136; Sugiarni & Firdaus, 2024, p. 1146). Broadly speaking, **collaborative learning** refers to learning processes in which students "lear[n] with and from each other" (Boud, 2001, p. 2, also quoted in Meer & Chapman, 2014, p. 1), i.e. "each participant acquires and imparts knowledge or experience" (Aldawi & Maher, 2023, p. 266). It can be highly beneficial for students (as reviewed by Meer & Chapman, 2014, p. 1) and may serve pedagogical as well as pragmatic objectives (Meijer et al., 2020, p. 1223). Pedagogical objectives pertain to the educational aims, such as cognitive, social and communicative, or attitudinal and motivational outcomes (Strijbos, 2011, cited by Meijer et al., 2020, p. 1223). Pragmatic objectives, in turn, relate to the practical benefits and efficiencies gained from implementing collaborative learning. Examples include the sharing of learning materials as well as reduced time expenses (as synthesized by Meijer et al., 2020, p. 1223).

Collaborative learning paves the way for increasing critical thinking skills and offers new ways of gaining knowledge (Gokhale, 1995). Accordingly, collaboration is an essential skill for studying and work and should therefore be enacted and fostered in higher education. For instance, peer feedback based on peer collaboration can be valuable for the advancement of critical thinking, writing proficiency (López-Pellisa et al., 2021) and other skills. Especially in today's digitalized world, digital tools can motivate and facilitate collaboration and peer feedback processes substantially (cf. López-Pellisa et al., 2021). Consequently, it seems worthwhile to encourage peer feedback by implementing digital feedback formats.

Moreover, the integration of peer feedback aligns with dialogic conceptualizations that understand feedback as "an interpersonal process" (Chong, 2021, p. 99) or "social practice" (Evans, 2013, p. 103) which presupposes collaborative skills (Nicol et al., 2014, pp. 210, 215; Schluer, 2022a, p. 242; H. Zhang et al., 2022, 3). Specifically, **peer feedback** means that two persons "take the reciprocal roles of being a provider and a receiver of comments" (Zhu & Carless, 2018, p. 883) and scaffold each other's learning (see Vygotsky, 1978; cf. A. S. Alharbi, 2025, p. 5; Farahian & Noori, 2023, p. 107). It is not only a common professional practice but also an instructional strategy in higher education and other educational contexts (Huisman et

al., 2018; van den Berg et al., 2006, p. 135; cf. Cacciamani et al., 2024, p. 5211; Steenkamp & Brink, 2024, p. 11). For instance, Hansen and Liu (2005) view peer review as an important part of "the process writing approach" (p. 31; see section 2.5.4). Peer feedback is thus "not just a stage" of draft revision but "an integral component" of the entire writing process (Hansen & Liu, 2005, p. 38). In fact, it can be employed at any phase of the writing process to develop students' skills in manifold ways (Hansen & Liu, 2005, p. 32). This comprises the phases of brainstorming about appropriate topics, creating an outline of the paper and commenting on first written drafts (Hansen & Liu, 2005, p. 32). Thus, it could turn into a valuable approach for research planning and thesis writing (cf. Woodrow, 2020, p. 6). General advantages will be summarized next.

2.3.2. Possible Advantages of Peer Feedback

Overall, research has shown that not only the reception of peer feedback, but especially its provision can lead to the improvement of academic (writing) skills (Huisman et al., 2018; Nicol et al., 2014). Due to its reciprocity, peer review can thus be beneficial for students in two ways, i.e. as feedback receivers and feedback givers (e.g. Cui & Schunn, 2024, p. 2; Nicol et al., 2014; Y. Zhao et al., 2024, p. 535). The advantages can be clustered into social, affective, linguistic, cognitive and metacognitive aspects (cf. Schluer, 2022a, p. 39; see also Steenkamp & Brink, 2024, pp. 2, 11).

Socially, the peers learn to take responsibility not only of their own, but also of others' learning (Y. Sun & Doman, 2018, p. 6). This is boosted by the belief that "your success benefits me and my success benefits you", as captured by the positive interdependence hypothesis of cooperative learning (Johnson & Johnson, 1993, p. 138). The collaborative nature of peer review enables students to scaffold each other's learning processes (Min, 2005, pp. 294, 305), negotiate meaning collaboratively (Hernandez et al., 2017, p. 121; Y. Sun & Doman, 2018, p. 1; Zhu & Carless, 2018, p. 883), and enhance comprehension and communication skills (Brereton & Dunne, 2016, p. 29411). Importantly, peer feedback should not be implemented as a one-off event and "one-way interaction", but rather as an ongoing process in which students have the chance to engage in a dialogue about their learning (Tseng & Er, 2024, p. 133). However, most studies did not implement such iterative and dialogic designs to seize the full advantages of peer feedback (see review by Tseng & Er, 2024, p. 133), which is why the present study fills an important gap.

Affectively, positive feedback from peers can lead to increased confidence and motivation (Brereton & Dunne, 2016, p. 29414), with students finding it easier to accept critiques from peers than from tutors or teachers (Nicol & Macfarlane-Dick, 2006, p. 211). However, students might also have negative attitudes towards peer feedback, even before engaging in such an activity (Bloxham & West, 2004, p. 728). For instance, they could fear that the peers are not expert enough to evaluate their work and that their comments will be useless for them (Bloxham & West, 2004, p. 728; Jiang & Yu, 2014, cited by Dawson et al., 2023, p. 720; cf. review by

Steenkamp & Brink, 2024, pp. 8, 11). They might also be worried about providing critical feedback to others (e.g. Sugiarni & Firdaus, 2024, p. 1147). Consequently, there can be a range of negative emotions involved that students should learn to handle constructively through dialogue. Feedback dialogues therefore play a critical role in clarifying (non- or mis-) understandings, negotiating meanings, providing confirmation or expressing gratitude for the comments, and adding further feedback points (Y. Zhao et al., 2024, pp. 524, 530, 532). Eventually, the "feedback on feedback" may serve to develop students' feedback literacy, especially in peer-to-peer settings (cf. Y. Zhao et al., 2024, p. 524), but also to manage emotions through dialogue with the feedback provider. This might contribute to students seeing peer feedback more positively and recognizing its value (cf. Y. Zhao et al., 2024, p. 534).

Moreover, while assessing and talking about each other's work, learners become **cognitively** involved and "develop their critical thinking skills as they search for ways to have their ideas understood by their readers" (Y. Sun & Doman, 2018, p. 1). More precisely, reviewing requires skills in analyzing ("what does the text mean, how is it put together?"), evaluating (in how far "does the text meet academic requirements?"), explaining (what is the reason for the evaluation?[2]) and revising ("what changes are necessary to make the text meet the requirements?") (Flower et al., 1986, cited by van den Berg et al., 2006, p. 137). Put differently, three steps need to be accomplished: (1) problem detection, (2) problem diagnosis, (3) strategies for revision (Flower et al., 1986). The identification of problems presupposes knowledge about correctness and appropriacy as well as common genre structures. In that respect, they need to become aware of and "actively consider the task-specific processes and [assessment] criteria" (Huisman et al., 2018, p. 956; cf. Bloxham & West, 2004, p. 722; Nicol et al., 2014, p. 117). To verify their assumptions and assessment, they might search for relevant reference works, which can be beneficial for their own writing as well. Thus, learners develop critical reading skills for their own work and that of others by following these criteria (Y. H. Cho & Cho, 2011; Nicol, 2010, p. 509) or co-constructing them (see section 5.7.3). The co-creation and application of assessment criteria may deepen their understanding of expectations and advance their learning (cf. Bloxham & West, 2004, p. 722), for instance by considering these success criteria already in the planning stages of the current or next assignment (p. 731).

Additionally, by receiving feedback, students can become aware of the reader's perspective and identify areas that require revision or further clarification (Nicol et al., 2014, pp. 112, 116). Consequently, their **metacognitive** strategy use (Y. Sun & Doman, 2018, p. 6) as well as their audience awareness could be fostered (Berg, 1999, p. 232; Schriver, 1990, cited by K. Cho & MacArthur, 2010, pp. 330, 335; see also the review by C. Y. Chang, 2016, p. 87). In dialogic peer feedback designs, it is also likely that students realize flaws in their drafts or in their feedback, respectively. Hence, feedback dialogues might not only contribute to heightening writers'

[2] In the original quote, the focus is placed on giving reasons for why something is incorrect, even though reasons for right or good aspects might be valuable as well.

"audience awareness", but also readers' "writer awareness" (Y. Zhao et al., 2024, p. 535). Through dialogue, co-construction and "[p]roductive reflections" (Carless, 2019, p. 708), higher-order processes can be encouraged, which may foster students' self-regulated learning, also in the longer run (p. 709, also with reference to D. L. Butler & Winne, 1995).

In an "open feedback environment" (Wood, 2019; 2023; see section 3.3), an additional benefit is learning from seeing others' work and "others' feedback on others' errors" (Kemp et al., 2019, p. 158), including the suggestions other feedback providers have made. Through (tacit or interactive) observation, comparison and reflection, students' skills in generating (internal) feedback can be fostered (cf. the review by Gao & Chen, 2025, p. 22). Moreover, it can help them develop their own feedback-giving practices (Gao & Chen, 2025, pp. 23, 32). Such learning by observing other learners, their errors (Mayes, 2015), ideas, strategies and reasoning has been called "**vicarious learning**" or "imitative learning" (Bandura et al., 1963). It is seen as a type of collaborative learning, as is also reflected in the term "social facilitation" (Bandura, 1965). As they gain insight into alternative pathways or perspectives (see also Brereton & Dunne, 2016, p. 29411), they might become aware of other possible ways of approaching a task. This has two major benefits. On the one hand, the variety of perspectives can help develop each student's unique approach to academic writing (Mutwarasibo, 2013). On the other hand, it also results in a greater detachment and hence more objectivity towards their own work (cf. Nicol, 2010, p. 509; Nicol & Macfarlane-Dick, 2006, p. 211). Hence, seeing a variety of examples and possible solutions that other students have created (some of which might be adequate and some of which might be in need of improvement) may help them to refine their understanding of high-quality work (Sadler, 1989, p. 129; 2010, p. 542) and become more critical of their own production (Nicol, 2010, p. 509). More precisely, reviewing higher-quality work can prompt students to identify areas for improvement in their own work. Similarly, reviewing lower-quality work can help them recognize and avoid errors (Nicol & McCallum, 2022) that they might have overlooked in their own writing. Observing, assessing and evaluating peers' contributions can thus enable vicarious learning and enhance skill development in manifold ways (Livsey & Lavender-Stott, 2015; cf. Hui et al., 2024, p. 339).

Especially if feedback comes from **multiple peers**, draft revisions tend to be of higher quality (Cho & Schunn, 2007, quoted in K. Cho & MacArthur, 2010, p. 330). Students might accept peer critiques more readily than teacher comments (Nicol & Macfarlane-Dick, 2006, p. 211), e.g. because the kind of language the peers use tends to be more relatable and easier to understand than teacher talk (K. Cho & MacArthur, 2010, p. 329; Falchikov, 2005, cited by Tseng & Er, 2024, p. 133; Nicol, 2010, p. 509; Nicol & Macfarlane-Dick, 2006, p. 211). Furthermore, several persons usually offer various perspectives, which can be inspiring and encourage critical reflection (Todorova, 2024, p. 4). However, receiving feedback from many peers can also be overwhelming for students (Cui & Schunn, 2024, p. 10), which is why considerations regarding the number of feedback providers are important. Moreover, if peers can see the

feedback that others have already provided to a person, they might refrain from contributing a different opinion (Gao & Chen, 2025, p. 36).

Language-wise, there are further benefits to be mentioned. In addition to potential rhetorical and linguistic improvements of their papers (Y. Sun & Doman, 2018, p. 1), peer feedback enhances students' communicative skills that are necessary for successful interaction and cooperation during the review process (K. Hyland & Hyland, 2006, p. 92; see also Brereton & Dunne, 2016, p. 29411; Irwin, 2019, p. 44). For example, explaining their feedback to their peers (e.g. about errors or misconceptions) not only requires communicative skills (in the foreign language), but also deepens their own understanding of the relevant concepts (Nicol et al., 2014, p. 105; cf. Sadler, 1989, p. 140). Moreover, learners can clarify and discuss the given feedback through the negotiation of meaning (Hansen & Liu, 2005). These interaction skills are also crucial for heterogeneous groups and they thus intersect with the social dimension of peer feedback.

Finally, a peer approach may make the learners more aware of the **active role** they should play in the feedback – and learning – process (cf. Cacciamani et al., 2024, p. 5211; Irwin, 2019, p. 44; I. Lee, 2014, p. 1; Yuan & Kim, 2015, p. 413; Y. Zhao et al., 2024, p. 534). In the end, feedback can only be effective if learners actively engage with it and respond to it. Through peer approaches, they might obtain a clearer picture of what is involved in the entire process from distinct perspectives. In that regard, in-process and follow-up dialogues can be helpful to advance learning (see e.g. Y. Zhao et al., 2024, p. 531). For example, in the study by Y. Zhao et al. (2024), the feedback recipients adopted a more active role by requesting more details or specific solutions from their peers (p. 534). Moreover, the dialogic process encouraged the feedback-providing peers to write "more constructive and actionable comments […] by adding more specific information" or alternative suggestions (Y. Zhao et al., 2024, p. 533).

All in all, peer feedback could thus contribute to more learner-centered teaching (Widodo, 2013, p. 203) as well as deeper critical reflection and understanding. However, the success of peer feedback activities depends on careful preparation and guidance, as the next section will discuss.

2.3.3. Need for Peer Feedback Training

Learners' prior knowledge and experience with feedback influences the peer process and its outcomes, which is why "appropriate apprenticeship training" is essential (Cui & Schunn, 2024, p. 4). In their paper, Hansen and Liu (2005) highlight the crucial role played by teachers in the planning, training, and coaching of the learners to increase the effectiveness of the peer response activities (see Winstone & Carless, 2020; cf. the review by Y. Zhao et al., 2024, p. 535). They distinguish between a pre- (training), while- (coaching), and post- (evaluation and application) phase of peer feedback.

Apart from the sequencing of different tasks and feedback activities, the **planning** comprises decisions about when to incorporate peer and teacher feedback (Hansen & Liu, 2005, p. 32). Hansen and Liu (2005) propose including teacher feedback at different stages of the writing process, not at the same ones in which peer feedback was performed (p. 32). At any rate, a 'peer feedback before teacher feedback' approach is recommended (cf. Neumann & Kopcha, 2019), as students might consider teacher comments as "the final solution", which would discourage additional contributions by the peers (see review by Schluer, 2022a, p. 38).

Before peers engage in feedback activities, sufficient time should be devoted to **training** the students (Hansen & Liu, 2005; Y. Sun & Doman, 2018; Yu et al., 2019, p. 62). This comprises the sharing of experiences and clarification of expectations as well as familiarization with feedback strategies and tools (see Schluer, 2022a, pp. 35–44; cf. review by Dawson et al., 2023, pp. 720–721). Hence, in a first step, students' prior experiences with and perceptions of feedback should be discussed (cf. M. Yang & Carless, 2013, p. 293) in order to co-establish a common understanding of the purposes and processes of feedback (cf. Price et al., 2010, p. 278). More specifically, learners should be encouraged to share their experiences with and attitudes towards group work and peer review (Hansen & Liu, 2005, p. 33). This might also include cultural factors as well as personal concerns shaping their attitudes towards peer feedback (Hansen & Liu, 2005, p. 33). In that respect, teachers could describe their own previous experiences with peer review (Çiftçi & Kocoglu, 2012, cited in Dawson et al., 2023, p. 718), comprising positive and challenging aspects. Such an open discussion may help to create a comfortable atmosphere of mutual trust, which is essential for the success of peer response activities (Hansen & Liu, 2005, p. 33; cf. Rath, 2025, p. 2). Furthermore, decisions about the feedback modes and tools need to be made (Hansen & Liu, 2005, p. 33; Schluer, 2022a; Schluer & Liu, 2024, p. 140; see section 2.6). This is the most crucial aspect that is investigated in the current research.

Also, students will need suitable peer feedback guidelines, models or forms to support the process (Hansen & Liu, 2005, pp. 34–35; cf. Beaumont et al., 2011, pp. 674–675; Carless & Boud, 2018, pp. 1320–1321; Nurkhamidah et al., 2024, pp. 233, 242). Templates for feedback requests could be provided, which encourage self-reflection on the one hand and guidance for the peer reviewers on the other hand. For instance, the self-assessment and feedback request sheet could include an item such as "I have difficulty with _____. Please let me know if you find any problems with this in my paper." (Hansen & Liu, 2005, p. 34; cf. suggestions in section 5.7.2.4). The guiding questions or templates for peer review will, however, depend on the type of task and the feedback purpose (Hansen & Liu, 2005, p. 33). To familiarize students with appropriate review criteria, they could be asked to generate and discuss such criteria themselves prior to the feedback phase. Commonly, a distinction is made between content, language/ style, and form/ structure (cf. Schluer, 2022a, p. 22), which, however, strongly depends on the task

objectives and assignment (see e.g. the feedback taxonomy by Brück-Hübner & Schluer, 2023; Schluer, 2024g; Schluer & Brück-Hübner, 2025).

Especially in foreign-language classrooms, the peer review sheets will also provide language models for the students (Hansen & Liu, 2005, p. 36). Aside from language proficiency, cultural factors should be borne in mind, as pragmatic norms can differ (F. Hyland & Hyland, 2001; K. Hyland & Hyland, 2006) and could lead to misunderstandings or negative perceptions of the peers and the quality of their comments (see sections 2.4.7 and 2.4.8). Therefore, training in linguistic strategies for the expression and negotiation of meaning would be valuable (Hansen & Liu, 2005, p. 36). For both feedback producers and recipients, a repertoire of clarification questions (e.g., "I'm not sure what this means. Can you clarify this?") and elaboration questions ("Could you explain this point in more detail?") is likely to facilitate the process (Hansen & Liu, 2005, p. 36). Again, an active involvement of the learners in the generation and discussion of such questions is recommended (Hansen & Liu, 2005, p. 36). Thus, apart from a familiarization with feedback provision, students also need training in feedback reception, as emphasized by Yu et al. (2019, p. 62), for instance. For both perspectives, this includes a discussion of feedback engagement on affective, cognitive, social, and behavioral dimensions (see section 5.7.2.4 on feedback responses). In that respect, teachers are again encouraged to share their own experiences with peer review and how it helped them to improve their papers (Hansen & Liu, 2005, p. 35). Further training steps may include the collaborative review and revision of a sample draft (Hansen & Liu, 2005, p. 35).

As highlighted by Wu and Schunn (2021), the peer feedback training should also raise learners' awareness of important feedback features. Prior research has shown that comments containing explanations and suggestions were much more likely to be implemented than those that did not contain any (Wu & Schunn, 2021, p. 381). Even though this means extra work for the peer assessors (Wu & Schunn, 2021, p. 385), they can learn a lot from it, and their peers are more likely to understand the reasons (p. 386). It might also influence students' intention to address an issue ("planning to fix"), which was found to be the largest predictor of implementation in Wu and Schunn's (2021) peer feedback study (p. 381). Explanations alone already make an implementation nearly 1.8 times more likely (Wu & Schunn, 2021, p. 381), which underscores their significance. The interconnections are detailed in Wu and Schunn's (2021) feedback model shown in Figure 1, with the thickness of the lines signaling the statistical strength of the relations.

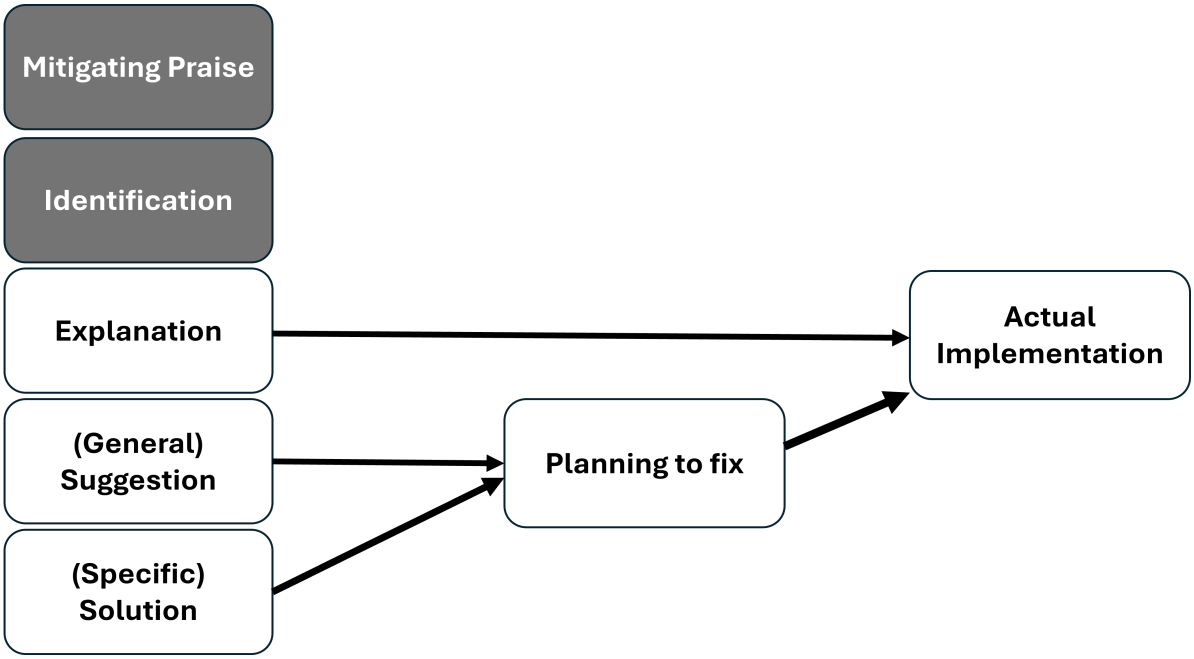


Figure 1: Feedback Model Adapted from Wu and Schunn (2021, p. 384)

To ease the provision of explanations for the peer reviewers, teachers could provide a grid with guiding questions that asks for the "what" and "why" of the suggested changes or corrections (Gielen & De Weaver, 2015 a, 2015b, cited by Wu & Schunn, 2021, p. 387).

Throughout this training, students should feel free to ask open questions about the peer response process, agree on criteria and roles as well as rules with their peers (Hansen & Liu, 2005, p. 35). Whenever new tools or programs are used for the review activity, they should be given time for their exploration and familiarization as well (Hansen & Liu, 2005, p. 35; Schluer, 2022a, p. 36; cf. J. Chen & Bogachenko, 2023, p. 9944).

In addition to the training before peer review, students might require ongoing **coaching** during the peer feedback activity. Teachers could monitor students' feedback process and provide support whenever needed (Hansen & Liu, 2005, p. 37). Moreover, they can "encourage students to hold meetings to share their experiences, feelings, emotions, cognitions and behaviours about peer feedback with each other" (Yu et al., 2019, p. 62). Also, in case peer review is conducted in groups, one peer could take on the role of an observer and keep track of the kinds of comments and questions that are exchanged (Hansen & Liu, 2005, p. 36).

Furthermore, the **evaluation** of the feedback received and of the feedback activity as such are crucial steps. The feedback recipients should be guided to evaluate the feedback and to apply it when deemed helpful (Wu & Schunn, 2021, p. 387). The process of reflective thinking can lead to more "mindful reception" by the students (Bangert-Drowns et al., 1991, p. 233). Teachers can model this process and suggest potential ways for students to set up an action plan for revision and further learning (Hansen & Liu, 2005, p. 37; e.g. Schluer, 2024i, pp. 45–46). Moreover, teachers can provide supplementary feedback to add depth to the peer

comments (Nurkhamidah et al., 2024, p. 242). In openly visible (multi-peer) feedback environments (cf. section 3.3), learners might also be encouraged to read not only "the feedback given to them" but also the feedback that others received, which can result in further reflections and insights (Albarqi, 2023, p. 194). Additionally, students could create learning logs to document the feedback and insights gained (see also the idea of feedback portfolios described by Schluer, 2022a, pp. 222–223, based on Winstone, 2019; cf. also the FEATS video channel at https://www.youtube.com/@feats1983, e.g. https://youtu.be/4gGXktmAiFk). As a follow-up, students would use the peer responses and self-reflections for their next draft (Hansen & Liu, 2005, p. 37). Further rounds of feedback with other groups of peers could also be conducted before the final draft is submitted (Hansen & Liu, 2005, p. 37). Students might likewise be asked to submit a summary of the changes together with their final submission.

Finally, the peer response activity should be evaluated to derive potential improvements. In that respect, students are encouraged to reflect on what worked well or not and on "what they would do differently" next time (Hansen & Liu, 2005, p. 38). In line with that, online surveys and classroom discussions will be implemented after each peer feedback phase in the current study (cf. methodological section, in particular Figure 4).

Overall, "[o]ngoing teacher scaffolding with modelling and monitoring is [thus] essential to establishing a supportive and sustainable learning environment for initiating and maintaining productive feedback dialogues", as Y. Zhao et al. (2024, p. 535) summarized in their recent paper. Often, however, peer feedback was carried out on products, such as drafts of an essay that was to be submitted after revision. By contrast, peer feedback on the writing process (cf. van den Berg et al., 2006, p. 146) or embedded within longer projects, such as research planning, has been much rarer. The next sections will therefore survey previous studies about feedback in thesis supervision and thus address the central assignment type of the present research.

2.4. Feedback in Thesis Supervision

In contemporary higher education, the final thesis plays a pivotal role as a requirement for graduation (Nouri, Larsson & Saqr, 2019, cited by Lei & Pramoolsook, 2020, p. 166) and as a transition from studenthood to scholarship (Ylijoki, 2001, p. 21, quoted in Neupane Bastola & Hu, 2023, p. 1). It has therefore turned into a crucial element of degree programs, not only at PhD but already at Master levels or earlier (Biggam, 2017, quoted by Neupane Bastola, 2021, p. 565; Neupane Bastola & Hu, 2023, p. 1). Often, it is the first comprehensive piece of scholarly work that students produce independently (Neupane Bastola, 2021, p. 565). As such, it constitutes a new genre (Lei & Pramoolsook, 2020, p. 166) and "a new type of learning activity" (Woodrow, 2020, p. 3) for them, potentially causing several uncertainties and open questions that they strive to resolve. Consequently, the Master thesis represents a crucial step for students, marking their shift "from […] [rather] reactive students to proactive researchers" (Lum, 2018, p. 111,

cited by Neupane Bastola, 2021, p. 565). In this transformative journey, the provision of feedback to thesis writers is particularly significant and needs to be tailored to individual students' specific needs (Bitchener, 2017, p. 90, quoted in Neupane Bastola, 2021, p. 565). Prior research mostly concentrated on supervisors' feedback in the research planning, writing and assessment process, whereas peer feedback has been examined less frequently (e.g. Yu et al., 2019). It might be argued, however, that peer feedback can be highly profitable for novice researchers going through similar stages of project planning (Steenkamp & Brink, 2024, pp. 4, 8). The next subsections 2.4.1 to 2.4.8 will therefore review the literature on feedback in thesis supervision, including students' and supervisors' roles, research on feedback functions and contents as well as linguistic and cultural aspects. All these factors can have an impact on students' engagement with feedback, which will be discussed in the last subsection 2.4.9.

Beforehand, a brief remark on the diverse uses of the terms "thesis" and "dissertation" is due. As Woodrow (2020) remarked, a "dissertation" often denotes "the document produced for a master's degree" in British and Australian English, whereas it is situated at the PhD level in the US (p. 1). Hence, "thesis" would be the common term for undergraduate and graduate papers produced for the completion of a bachelor's or master's degree program in the US, while "dissertation" refers to the product of the PhD journey (Woodrow, 2020, p. 1). This is the terminology that will be adopted in the current work. Additionally, "thesis" will be used both for Master theses and PhD work, but the term "dissertation" will exclusively be employed for doctoral theses. This usage is in line with most of the studies that were reviewed for the present book.

2.4.1. Supervisory Feedback

Scholars assert that supervisory feedback is not only "a form of communication" between students and supervisors (Kumar & Stracke, 2007, p. 462), but often "the main form of instruction" and learning during the thesis-writing process (Basturkmen et al., 2014, p. 433; cf. Bitchener et al., 2010, p. 82). It is seen as "a personalized form of pedagogical support" (Neupane Bastola & Hu, 2023, p. 1, with reference to Grant, 2010) intended "to develop students' research skills and academic writing competence, facilitate their application of methodological knowledge to specific research projects, and foster their ability to make informed decisions" (Neupane Bastola & Hu, 2023, p. 5). Positive comments and constructive suggestions serve as important scaffolding and as a means of motivation and encouragement (Neupane Bastola & Hu, 2023, p. 6). Ideally, the feedback should be embedded in an ongoing dialogue towards greater independence (T. Wang & Li, 2011, pp. 101–102,) and academic enculturation through which they become familiar with the norms and values of their disciplines (Hyland, 2009, p. 132, quoted by Lei & Pramoolsook, 2020, p. 166, as well as by Basturkmen et al., 2014, p. 433, and Bitchener et al., 2010, p. 82). Apart from the general challenge of academic discourse socialization (Bitchener et al., 2010, p. 80), language barriers could arise from limited language proficiency to

understand the feedback comments (Neupane Bastola & Hu, 2023, p. 10) and their underlying academic concepts (cf. Duncan, 2007, pp. 273–274, 277; Weaver, 2006).

Accordingly, researchers have become interested in investigating supervisors' feedback practices and their impact on students' thesis drafts (Lei & Pramoolsook, 2020, p. 166; Neupane Bastola & Hu, 2023, p. 1). In that respect, students' and supervisors' perceptions of their roles and responsibilities play an important role, as the next section will elucidate.

2.4.2. Roles of Students and Supervisors

Feedback is a social practice that not only hinges on the contents and quality of the comments but is also influenced by each person's perceived roles and interpersonal relations (T. Wang & Li, 2011, p. 102). For effective supervision practices and thesis writing success, students and supervisors therefore need to clarify their roles (Thompson et al., 2005, cited by Millin et al., 2022, p. 234). Overall, numerous models of supervision exist, each with distinct conceptualizations of the pedagogical relationship between supervisors and students. In their recent review, Grohnert et al. (2024, p. 5) cited several models, such as the technical rationality model, the negotiated order model, the teaching model, the apprenticeship model, and the partnership model. In these models, the degree of authority and agency on the side of the student and supervisor varies (Grohnert et al., 2024, p. 5) so that two extremes might be identified. Hence, the focus will be placed on two models which encapsulate fundamentally different role understandings of supervisors as "experts" (or "master") or as "peers" (or "critical friends") (cf. M. Pearson & Brew, 2002, p. 139).

A traditional approach, often characterized as the **expert-novice model** or master-apprentice model, positions the supervisor as the expert guiding the novice through the research process (Kumar & Stracke, 2007, p. 462; Morton et al., 2014, p. A24). Herein, feedback is seen as "a form of teaching" with clear power imbalances (Kumar & Stracke, 2007, p. 462), which is why it has occasionally been called the "master-slave" model (Grant, 2008, quoted in Bitchener et al., 2010, p. 83). Critiques of this model highlight the risk of students accepting feedback uncritically as they cannot or do not want to question the perceived authority and expertise of the supervisors (Knowles, 1999, cited in Morton et al., 2014, p. A24, and in T. Wang & Li, 2011, p. 102). This can cause passivity on the part of the students and make them overly reliant and dependent on the supervisor's feedback (T. Wang & Li, 2011, p. 102; Yorke, 2003, cited by McConlogue, 2015, p. 1497). Moreover, this makes it harder for students to develop their own understandings and confidence in their abilities (ibid.).

The **peer model**, by contrast, draws on Vygotsky's (1978) sociocultural theory and envisions a dynamic relationship that evolves progressively from expert-novice relations to cooperation and collaboration (Morton et al., 2014, pp. A24–A25). Feedback in this model is considered as scaffolding, which guides students towards taking greater responsibility for their research and writing (Morton et al., 2014, p. A25; see also Bitchener et al., 2010, p. 82). This

approach aligns with “a social view of writing” (Basturkmen et al., 2014, p. 433), emphasizing the importance of students’ enculturation into academic discourse communities (see also K. Hyland, 2009). Apart from supervisors, fellow students can function as feedback partners, for instance, when they feel more capable in a particular topic domain or skill area (cf. Bitchener et al., 2010, p. 83). Importantly, in this model, the supervisor-student relationship is more egalitarian than in the initial expert-novice paradigm (Bitchener et al., 2010, p. 83).

Through a gradual decrease in scaffolding, learner’s responsibility and expertise as well as the more collegial nature of the supervisory relationship grows (Morton et al., 2014, p. A26). With it, the amount and kind of feedback changes (Morton et al., 2014, p. A26). In that respect, the peer model promotes a collaborative and dialogic relationship, where students become “active agents in the feedback process” (de Kleijn et al., 2013, p. 1014). This complies with the idea that feedback should allow students to retain ownership over their work, encourage critical engagement as well as the negotiation of knowledge and expression of their own academic voice and identity (Morton et al., 2014, pp. A25, A34). The significance of students’ agency is thus highlighted, empowering them to challenge the feedback and engage in collaborative processes with peers and supervisors (Mohammed & AL-Jaberi, 2021, p. 10).

Regarding the development of academic voice and authority, Morton et al. (2014, p. A24) resort to Bakhtin’s (1981, 1986) theory of dialogism. This theory, in particular the notion of heteroglossia, foregrounds the multi-voiced nature of texts, which are “filled with others’ words, varying degrees of otherness or varying degrees of ‘our-ownness’” (Bakhtin, 1986, p. 89, as quoted by Morton et al., 2014, p. A27). Crucially, Morton et al. (2014) view feedback as part of this intertextuality (p. A25). While Master and PhD students engage with the existing literature and connect it to their own research, feedback may serve as “a point of intertextual engagement through which textual authority, ownership and authorship are negotiated between supervisor and student over time” (Morton et al., 2014, pp. A24–A25).

Likewise, the supervisory relationship can be negotiated continuously between students and their supervisors with regard to their respective roles and responsibilities (see the review by Grohnert et al., 2024, p. 2). The negotiation of the supervisor-student relationship could depend on the stage of the student’s research, their confidence, and the desired level of engagement and independence, as the study by T. Wang and Li (2011) has shown. More precisely, students in early stages of the doctoral research process had lower confidence in their academic skills and perceived supervisor’s feedback as negative and overwhelming (T. Wang & Li, 2011, p. 106). They followed the feedback “without much questioning” (T. Wang & Li, 2011, p. 107) and also expected the supervisors to tell them what to do. Conversely, those with higher self-confidence demonstrated resilience and reflexivity in dealing with critical feedback (p. 106). Furthermore, they expected supervisors to challenge their ideas and proactively as well as strategically engaged in the feedback and revision processes (pp. 106–107). They thus began to recognize their own responsibility in academic research and writing, with knowledge

being constructed rather than transmitted by supervisors (p. 106). Hence, along the (PhD) research process, the nature of the supervisory relationship and the types of feedback practices can vary (T. Wang & Li, 2011, p. 109). In that respect, student perceptions of the supervisory relationship and of feedback can be seen as mediating variables (cf. de Kleijn et al., 2013, p. 1014). Moreover, their conceptions and beliefs about research are influential (M. Pearson & Brew, 2002, p. 144), along with their own expectations, aspirations and skills (cf. Grohnert et al., 2024, p. 5; see discussion section 5.7.1). Apart from the role perceptions, the specific nature of the research and thesis writing task as compared to coursework needs consideration, as will be outlined next.

2.4.3. Particularities of Theses and Dissertations as Compared to Coursework

The existing literature on feedback in the context of undergraduate studies, PhD supervision, and Master thesis supervision reveals a noticeable disparity in the amount of research dedicated to these different academic levels. Notably, in contrast to undergraduate academic writing, there has been comparatively little research about feedback at Master and PhD levels (de Kleijn et al., 2013, p. 1012; Swartz & Gachago, 2018, p. 2018; cf. Xu & Hu, 2020, p. 724).

In that regard, de Kleijn et al. (2013) outlined three major differences between (undergraduate) **coursework** and (postgraduate) research projects. First, the Master thesis is characterized by its longer duration, usually comprising at least half a year of work (de Kleijn et al., 2013, p. 1013). Second, in Master theses, students pursue individual projects with diverse and complex goals, as they commonly choose the topic on their own (only at some universities, thesis supervision takes place with groups of students; de Kleijn et al., 2013, p. 1013). Third, and related to the former two characteristics, is the highly individual and cyclical nature of the feedback and supervision process (de Kleijn et al., 2013, p. 1013).

Additionally, Woodrow (2020) contrasts coursework with **both Master and doctoral theses**. Master and doctoral theses are “expected to be independent” work, whereas course assignments are typically the same for most or all students and have a much “lower level of freedom” (Woodrow, 2020, p. 2). In their thesis, Master and doctoral students usually make some contribution to the knowledge in a given subject field, whereas many coursework assignments are about the reproduction of knowledge and the application of specific set of skills or techniques (p. 2). Also, they need to review a greater breadth of literature, assess their relevance, and build an argument by synthesizing it critically and succinctly (cf. pp. 2, 4). The scope and length of assignments is thus much shorter and more clearly defined than that of theses (p. 2). Given its more complex nature, thesis work also demands careful planning and effective time management from the students (p. 4). Furthermore, instructional techniques and feedback practices differ insofar that theses mostly rely on individual consultations with the supervisors (Woodrow, 2020, pp. 2–3, 63). The grade awarded for the master thesis also has a higher credit load for the final degree than coursework does (p. 3). Even more so, the successful completion

of a PhD thesis has an impact on the candidate's career path (p. 3). Accordingly, affective factors can influence the thesis process in positive and negative ways, insofar that students might need to cope with personal motivations and aspirations as well as anxiety and stress (cf. Woodrow, 2020, p. 5).

Moreover, there are some noteworthy differences between postgraduate (Master) theses and **PhD work**. Crucially, doctoral students differ from Master students in their higher familiarity with academic discourse and research experience, as they have already passed their (post-) graduate studies (Neupane Bastola, 2021, p. 566; cf. the review by Grohnert et al., 2024, p. 13). Furthermore, while Master students mostly engage in thesis writing to obtain their final degree, the decision to conduct PhD research is often driven by students' interest in a particular topic, aside from earning a PhD degree for reasons of employability, for instance (Neupane Bastola, 2021, p. 566). The timeframe and length of the theses constitute further major distinctions between Master and PhD students (Neupane Bastola & Hu, 2023, p. 2; see the review by Grohnert et al., 2024, p. 13). Accordingly, also their feedback needs differ (Neupane Bastola & Hu, 2023, p. 2). However, the supervision and feedback processes in these contexts have only been researched to a limited extent. If so, studies mainly concentrated on supervisory practices rather than peer feedback among supervisees, as the next section will show.

2.4.4. Prior Research on Feedback in Thesis Supervision

In prior research, the focus was mostly set on supervisors' actions (see the review by Grohnert et al., 2024, p. 10), i.e. the feedback provided by supervisors, as well as students' attitudes towards it. By contrast, little is known about students' perceptions and practices towards peer feedback in the process of thesis writing (Yu et al., 2019, p. 50). Accordingly, the analysis of peer feedback products and student perceptions will become the focus of the present study (see methodology and results sections). Indeed, peer feedback may help to overcome some of the challenges associated with thesis supervision and academic writing (Yu et al., 2019, p. 52). To this end, available research on supervisors' feedback will be synthesized below. It must be acknowledged, though, that most studies centered on supervisory feedback on PhD rather than Master theses (Millin et al., 2022, pp. 231, 235; Neupane Bastola, 2021, p. 565; Neupane Bastola & Hu, 2023, pp. 1–2). In particular, this gap relates to students' perceptions and even more so to a complementary consideration of students' and supervisors' perspectives (Millin et al., 2022, p. 232).

At PhD level, Kumar and Stracke (2007) analyzed supervisors' written feedback, while Xu (2017) examined her text revisions in response to the supervisory feedback. Moreover, a number of review articles on PhD supervision exist (Gray & Crosta, 2019; Hassan et al., 2009; Masek & Alias, 2020; McCallin & Nayar, 2012), which emphasize the importance of student-supervisor interactions and the role of feedback production and reception (all sources cited in Grohnert et

al., 2024, p. 13). However, many studies were rooted in unidirectional models of feedback provision, as reflected by the expert-novice paradigm described above (section 2.4.2).

For research on Master thesis supervision, only one recent review article was found (Grohnert et al., 2024). This is surprising, given the increasing number of students enrolled in Master's programs (statistics reviewed by Grohnert et al., 2024, p. 13) and the central role of constructive feedback for the successful completion of the Master thesis (Millin et al., 2022, p. 235). Altogether, Grohnert et al. (2024) analyzed 36 published studies to identify the current state of knowledge and existing gaps. From this, they derived a summative framework of effective Master thesis supervision, in which they distinguished between inputs, processes, outcomes, and contextual factors (see chart in Grohnert et al., 2024, p. 7). Some critical components that are relevant to the current work will be selectively presented in the next paragraphs.

First, with regard to **knowledge**, Grohnert et al. (2024, pp. 10–11) mention research- and thesis-related knowledge (of topic domain, academic standards, writing conventions, methodology) as well as experience in thesis supervision. Concerning skills, they add (English) writing skills, critical and conceptual thinking skills, as well as social skills and supervision skills (Grohnert et al., 2024, p. 11). Concerning the relationships between supervisors and students, they cite trust and consistency as important preconditions, as well as the negotiation of roles and power (see section 2.4.2), including awareness of potential cultural differences and their implications on the thesis writing and supervision process (Grohnert et al., 2024, p. 9). Attitudes also play an essential role, both on the part of the students (intrinsic motivation, expectations, task-related attitudes) and supervisors (professionalism, but also approachability and friendliness, as well as demanding and supportive stances) (Grohnert et al., 2024, p. 11). Likewise, their actions are central variables (for details about recommended student actions and supervisor actions, see Table 3 in Grohnert et al., 2024, pp. 8–9). For instance, students should demonstrate self-management skills, e.g. through adequate planning, show proactivity in discussions with their supervisor, and engage with feedback (p. 9). Supervisors, in turn, should clarify requirements and manage expectations, especially at the start of the thesis process (pp. 9–10). Moreover, they should adapt their supervisory actions according to students' needs and their thesis progress (see also section 2.4.2). This also entails providing support and feedback while increasingly nurturing student agency (Grohnert et al., 2024, pp. 9–10). Furthermore, Grohnert et al. (2024, p. 12) drew attention to variables relating to contextual characteristics, including the students' situation (part-time student, carework, etc.), the supervisor's situation (workload etc.) and the institution (support, resources, training etc.).

Eventually, in their review of studies, Grohnert et al. (2024, p. 7) identified four student-centered **learning outcomes** that are related to the above-mentioned elements of the model: (1) knowledge (about the topic, the domain, professional/ academic English vocabulary), (2) skills (in academic writing, research, project management/ planning and problem-solving), (3) attitudes (domain-specific values and beliefs, widened horizon and agency, gratitude towards

supervisor feedback, but also embarrassment and feeling burden), (4) confidence/ commitment (in one's knowledge, skills, academic voice, problem-solving, but also opposite tendencies). The effects can become visible in improvements in performance, such as the argumentative quality and language use of the thesis.

To enhance learning and outcomes, Grohnert et al. (2024, pp. 8–9) suggested six **supervisory actions**, one of which is the "provision of feedback". Their list of points seems to represent the outdated view of feedback as unidirectional information transmission (cf. Carless, 2022, in section 2.1), including the provision of timely and specific feedback that is constructive and encouraging, addressing "language and grammar (for non-native speakers)", "thesis content accuracy/ quality", "students' approaches to working" and "student progress towards their goals" (Grohnert et al., 2024, pp. 8–9). On the other hand, however, they state that a "dynamic, negotiated relationship between students and supervisors" is central, which aligns better with the contemporary view of a "negotiated order model" (Grohnert et al., 2024, p. 13) leaning towards student empowerment (section 2.4.2).

Grohnert et al. (2024) also acknowledged that the roles of technology (p. 12) and of Master students writing their thesis remotely need further exploration (p. 13). In their review, they ignored small-scale studies, which consisted of reflections on the supervision process (N=12 "records that report individual narratives and reflections of supervisors"; Grohnert et al., 2024, p. 6). However, case studies make up a considerable portion of prior research on thesis writing (Basturkmen et al., 2014, p. 434). For instance, there was only one PhD student involved in the studies by Kumar and Stracke (2007) as well as Xu (2017), two postgraduate Master students in Malaysia in the work by Saeed et al. (2021), three Master students in the study by Zheng et al. (2020) focusing on supervisor feedback, and another three Master students in Macau engaging in peer feedback on their thesis drafts as reported by Yu et al. (2019). Subsequent to this summative review, some relevant studies will therefore be introduced in more detail below, before findings related to different research foci will be presented (sections 2.4.5 to 2.4.9). Altogether, the studies emphasize the importance of examining feedback processes in thesis supervision from multiple perspectives and from a variety of data sources to elucidate their complexity and interrelationships.

To illustrate, Saeed et al. (2021) conducted a case study of two postgraduates at a Malaysian university and focused on supervisors' feedback formulation for the writing of a research proposal. The researchers collected supervisors' written feedback, students' responses to the feedback as well as their revisions, and additionally conducted follow-up interviews (Saeed et al., 2021, p. 1). In total, they analyzed 550 written feedback comments and categorized them according to their pragmatic functions while drawing on the analytical frameworks by Basturkmen et al. (2014) and Xu (2017). Moreover, they clustered students' responses into cognitive, metacognitive, and affective operations, following the work by Zheng et al. (2020)

and Yu et al. (2019), and checked whether they referred to aspects of linguistic accuracy, appropriateness, content, or organization (Saeed et al., 2021, p. 6).

Yu et al. (2019), by contrast, conducted a case study to examine how three Master of Education students at a Macau university engaged with peer feedback on drafts of their theses. They likewise utilized multiple data sources, including the writers' first and revised drafts as well as the final versions of their Master thesis, the peers' written and oral feedback, as well as interviews (Yu et al., 2019, p. 50). The analytical focus was placed on the Master students' affective, behavioral, and cognitive engagement with the peer feedback (Yu et al., 2019, p. 50). From this, they discussed pedagogical implications by underscoring the importance of prior training for both peer feedback provision and reception along the analyzed engagement dimensions (Yu et al., 2019, p. 62; see also Schluer, 2024g, pp. 83–84; Schluer & Brück-Hübner, 2025, pp. 299–300). The potentially beneficial nature of peer feedback in thesis writing was further stressed by a number of scholars (Mohammed & AL-Jaberi, 2021, pp. 10–11; Neupane Bastola & Hu, 2023, p. 11), but has not yet been investigated in detail. In light of the limited number of available studies, the next sections attempt to organize the literature into key categories that emerged from the review and might serve as a foundation for further analysis.

2.4.5. Research on Feedback Functions

Research on feedback functions in thesis supervision has extensively employed Kumar and Stracke's (2007) framework, which identified three major pragmatic intentions: referential, directive, and expressive (e.g. Basturkmen et al., 2014; Mohammed & AL-Jaberi, 2021; Neupane Bastola, 2021; Saeed et al., 2021; Xu, 2017). First, referential comments refer to aspects of the submitted work and offer information or corrections on content, editorial aspects, and organization. Second, directive comments contain directions, i.e. they require or recommend actions through questions, suggestions, or instructions. This may include requests for "clarification, justification, and confirmation" as well as "telling and suggesting what to do and not to do" (Saeed et al., 2021, p. 3). Third, expressive comments convey feelings and opinions as well as praise or criticism (Kumar & Stracke, 2007, p. 464; cf. Neupane Bastola, 2021, p. 566).

While several studies discovered a prevalence of comments with referential function (Basturkmen et al., 2014; Stracke & Kumar, 2010; Xu, 2017; all cited by Neupane Bastola, 2021, p. 566), most impact on revisions came from comments with expressive function (Kumar & Stracke, 2007, p. 467). For example, Neupane Bastola (2021, p. 570) observed a prevalence of referential comments but a rare use of mitigation in directive feedback in their study of supervisory feedback on Master theses in Nepalese higher education. They reasoned that this might have to do with the role perception of supervisors as authorities (Neupane Bastola, 2021, p. 570). Hence, findings might differ in other sociocultural settings and pedagogical designs (e.g. peer feedback).

The framework was modified and fine-tuned by other scholars (e.g. Basturkmen et al., 2014, p. 437; Xu, 2017, p. 243), who also tried to establish connections to the form or language of the feedback. For instance, directives could occur in declarative, interrogative, or imperative form (Xu, 2017, p. 244). Especially for short comments that are not formulated in complete sentences, categorizations might be hard to realize, as Xu (2017, p. 244) conceded. Analogously, feedback with a referential function can be expressed in several ways, such as through error codes or direct corrections (Xu, 2017, p. 244). This also appears to be influenced by the mode of feedback provision and the tools that are utilized for it (see Schluer, 2022a). Put differently, certain feedback media and modes might be more appropriate for some feedback purposes rather than others. To exemplify, researchers have argued that written feedback could be more suitable for micro-level corrections and oral feedback for macro-level advice (e.g. Ice et al., 2007, p. 125, cited in Roy & Vetter, 2023, p. 161). Moreover, scholars noted that many utterances or feedback actions can be assigned to "more than one category" (Kumar & Stracke, 2007, p. 464), as "any utterance may communicate more than one function" (Xu, 2017, p. 244, referring to Holmes, 2013). Additionally, the primary feedback functions are likely to differ for distinct assignments or stages. For example, formative feedback given at draft stage fulfills a different purpose than summative feedback on the final product (F. Hyland & Hyland, 2001, p. 188). The purposes that are pursued can also have an impact on the actual feedback contents, as will be briefly sketched below.

2.4.6. Feedback Contents

In the context of thesis supervision, there is limited knowledge of the specific information assessors prioritize when providing feedback (Bitchener et al., 2010, p. 79). Indeed, the content of the feedback can be influenced by several factors, such as the contents and quality of the thesis, the assessment focus, students' academic experience (Lei & Pramoolsook, 2020, p. 175) as well as the supervisors' understanding of their responsibilities (see section 2.4.2). This includes different views about whether linguistic accuracy (Bitchener et al., 2010, p. 92) and academic literacy development fall within the supervisors' purview (Neupane Bastola & Hu, 2023, p. 2).

Apart from feedback on language, the feedback could address the thesis contents, coherence, requirements, formalities, appropriateness, and acceptability (Basturkmen et al., 2014, p. 438; cf. the reviews by Neupane Bastola & Hu, 2023, p. 2; Saeed et al., 2021, p. 3). Basturkmen et al. (2014) and Xu (2017) found that most comments targeted linguistic accuracy, followed by contents or appropriateness (as cited by Saeed et al., 2021, p. 3). One likely reason is that feedback on linguistic accuracy and appropriateness can be provided rather quickly, whereas content-related feedback usually requires more elaboration (Saeed et al., 2021, p. 3).

Moreover, feedback strategies may vary across different draft stages, adapting to the focus of each phase and considering students' academic proficiency as well as the cognitive

difficulty of thesis topics (Lei & Pramoolsook, 2020, pp. 175, 178–179). For example, in Lei and Pramoolsook's (2020) study, supervisor T1 stated, "[b]ecause my feedback focus for each draft is different, and the quality of each student's draft is different, the way of providing feedback will certainly change accordingly" (p. 175).

Typically, a feedback comment consists of a verification (whether something is correct or not) and elaboration component (Kulhavy & Stock, 1989). Generally, research suggests that feedback should be elaborate, providing explanations and strategies for improvement to support students' growth (Shute, 2008, cited by de Kleijn et al., 2013, p. 1015). Accordingly, several studies examined the relations between various feedback features and students' use of the feedback (see the review by Wu & Schunn, 2021, p. 367). For instance, scholars were interested in whether comments that included "constructive recommendations in addition to pointing out the problem" (Wu & Schunn, 2021, p. 367) had an impact on their implementation in contrast to feedback that only contained an identification of the problem. For these analyses, often binary classification systems were used (e.g. simple vs. elaborate feedback) (p. 367), but also more complex categorizations, such as "mitigating praise, identification, suggestion, solution, and explanation" (Wu & Schunn, 2021, p. 368; see Figure 1 in section 2.3.3).

Furthermore, research investigated interrelations between the assessment focus and its form or function. To exemplify, Basturkmen et al. (2014) discovered that directives were commonly used for comments on content and cohesion/ coherence, whereas comments on linguistic accuracy/ appropriateness were mostly referential and given as information or correction (pp. 439, 442). Hence, solutions or corrections were typically offered for linguistic aspects, while suggestions and directions were usually provided for content-related issues (Basturkmen et al., 2014, p. 443). This also leads us to explore findings on the language of the feedback in the next section.

2.4.7. Linguistic Aspects

In academic feedback, especially within thesis supervision, the way language is used can influence students' emotions, understanding, progress, revisions, and subsequent learning outcomes (Neupane Bastola, 2021, p. 566). The reason is that feedback is a social practice that is shaped by and affects interpersonal relationships, which means that not only "the what" but also "the how" of feedback becomes crucial (T. Wang & Li, 2011, p. 102). Research in pragmatics has long demonstrated that communicators often attenuate the force of their speech acts — especially face-threatening ones such as criticism — by employing indirect linguistic structures (e.g. interrogative or impersonal constructions) and incorporating mitigating devices (hedges such as *might*, *possibly* or *could*) to soften their messages (Basturkmen et al., 2014, p. 442, based on P. Brown & Levinson, 1978, as well as Thomas, 1995).

Accordingly, feedback providers are usually advised to show awareness of this impact and exercise caution in feedback formulation (F. Hyland & Hyland, 2001, quoted in Neupane

Bastola, 2021, p. 566). On the one hand, excessive criticism can discourage students, and directive feedback requiring students to make specific changes might hinder self-regulation and deep learning (Vehvilainen & Lofstrom, 2016, and Winstone & Carless, 2020; both cited by Neupane Bastola, 2021, p. 566). On the other hand, the use of suggestions and questions rather than imperatives could empower students more profoundly, granting the feedback recipient authority over their writing and contributing to a respectful and egalitarian relationship (cf. Saeed et al., 2021, p. 10). Also, on-script comments instead of direct corrections give students the chance to either accept or reject them (Saeed et al., 2021, p. 10). Several scholars therefore deem an indirect approach as more suitable (Lei & Pramoolsook, 2020, p. 173), since it encourages students' reflective thinking (p. 177) and critical engagement while opening space for further interaction and negotiation (Saeed et al., 2021, p. 12, with reference to Lee, 2014). Likewise, teachers might prefer indirect feedback, especially in the form of interrogatives, "to stimulate students' thinking processes and to avoid appropriating students' texts" (Nurmukhamedov & Kim, 2010, p. 273, citing Ferris, 1997).

In the context of academic writing and scholarly publication, **hedges** have been allotted a crucial rhetorical function since they allow authors to express tentativeness, mitigate personal liability (Huebler, 1983, p. 18, cited in K. Hyland, 1994, p. 240; 1998, p. 353), anticipate criticisms (Salager-Meyer, 1995, 142) and foster open discussion about research (K. Hyland & Milton, 1997, p. 185). Hedges mark statements as tentative, providing space for alternative interpretations (M.-H. Chang et al., 2012, p. 295; K. Hyland, 1998, p. 353) and decreasing the danger of negation or humiliation, thus reducing potential threats to the writer's (Markkanen & Schröder, 1997, p. 8) and the reader's face (Meyer, 1997, p. 23; cf. review by M.-H. Chang et al., 2012, p. 295). As K. Hyland (1996b) put it, hedges are a "means by which a writer can present a proposition as an opinion rather than a fact" (p. 478).

In sum, a two-fold nature of hedges (and boosters) can be determined from the review of prior literature: (1) a content-related dimension and (2) a social or interpersonal dimension of hedging (and boosting, respectively) (K. Hyland, 1996c, p. 255; Mauranen, 1997, p. 115). First, the content-motivated utilization of hedging helps to present claims cautiously, acknowledging writers' or speakers' uncertainty towards propositions (Lakoff, 1972, cited by Gribanova & Gaidukova, 2019, p. 89) and anticipating potential counterclaims (K. Hyland, 1996c, p. 256). Second, audience- or reader-motivated hedging addresses interpersonal dimensions, such as fostering reader deference, engagement and cooperation (K. Hyland, 1996c, p. 257), by reducing face-threats through polite speech (Holmes, 1984; Mauranen, 1997, p. 115) while also aiming to heighten the acceptability of the claims (K. Hyland, 1996c, p. 255). The use of hedges thus helps to open "a negotiable dialogue" (J. Wang & Jiang, 2018, p. 197), leaving "room for feedback" and other opinions, enabling readers or recipients to adopt a more active role in the co-construction of knowledge and negotiation of contents (K. Hyland & Milton, 1997, p. 185). This

aligns with the social and socially situated nature of communication (K. Hyland, 1998, pp. 352, 373; Salager-Meyer, 1995, p. 141; 2000, p. 177), including feedback exchanges.

Compared to hedging, the complementary strategy of **boosting** has been studied less widely. Boosters are sometimes also referred to as "intensifiers" (e.g. Hosman, 1989, cited in Gribanova & Gaidukova, 2019, p. 86; Lakoff, 1973, p. 471) or "reinforcement" devices (Fraser, 2010, p. 22), as they serve to reinforce claims (e.g. *very* clear; Lakoff, 1973, p. 471) and express certainty (e.g. *certainly*, *obviously*; K. Hyland, 2005, p. 179). They not only demonstrate the writers' strong commitment to statements, but also serve persuasive functions, helping to establish a claim as consensually accepted and thus reducing the space for negotiation (K. Hyland, 1998, p. 353). At the same time, they reinforce a sense of group membership by assuming common ground and engaging readers in the writers' train of thoughts (K. Hyland, 1998, pp. 353, 368). In that regard, they position readers as "intelligent co-player[s]" who are likely to reach the same conclusions as the author or speaker (K. Hyland, 1998, p. 369).

Both hedges and boosters can be expressed through various linguistic mechanisms, such as prosodic, syntactic, lexical, and discoursal devices (Holmes, 1984, pp. 351–362). In the current and most prior research, the focus was set on lexical expressions. These comprise, for example, modal auxiliaries (*can*, *could*, *might*), cognitive verbs (*assume*, *believe*), adverbs (*partly*, *rarely*), and adjectives (*probable*, *possible*) (K. Hyland, 1996b, p. 480; cf. Salager-Meyer, 1995, pp. 131–133) as well as pronouns and phrases involving personal attribution (e.g. *we think* or *in my opinion*) (M.-H. Chang et al., 2012, pp. 295–296). Moreover, hedges and boosters can occur in clusters, combining several linguistic markers to weaken or reinforce the strength of an assertion (K. Hyland, 2005, p. 179; K. Hyland & Milton, 1997, p. 199). Examples include *it might be possible* (K. Hyland & Milton, 1997, p. 199), *it would seem likely that*, *it would be reasonable to assume*, or *it might seem somewhat unlikely that* (Salager-Meyer, 1994, p. 155).

In feedback research, the interpersonal function of hedging was considered primary (F. Hyland & Hyland, 2001, p. 197), serving to maintain "harmonious relationship[s]" (K. Hyland, 1998, p. 353) among the feedback participants while reducing negative affect, especially among the recipients of critical comments. As evaluation might involve a threat to learners' "developing confidence" (F. Hyland & Hyland, 2001, p. 194), teachers tend to tone down their negative remarks through mitigation strategies, such as through lexical hedges, questions and personal attribution (F. Hyland & Hyland, 2001, p. 185) or a combination thereof. Moreover, as F. Hyland and Hyland (2001) observed, praise was not necessarily used for commenting on positive aspects, but was in fact frequently employed (20% of all instances) to soften the negative effects of criticism (pp. 194–195). This adjacency of positive and negative comments was meant to produce more balanced feedback and to reduce overall negativity (p. 195). Furthermore, teachers often combined critical comments with suggestions (15%) or formulated them as suggestions (pp. 194–195). Hedges, however, were not only employed to mitigate criticisms, but also to soften suggestions (p. 185). More precisely, "76% of all criticism and 64%

of suggestions were mitigated in some way" in the study (F. Hyland & Hyland, 2001, p. 194). An example of a hedged suggestion was "It might also be good to change the order of your paragraphs/ ideas" (F. Hyland & Hyland, 2001, p. 197). What is more, hedging was sometimes used as part of a positive comment (p. 207). In those cases, hedging signaled a problematic aspect in a rather indirect manner, e.g. "Fairly clear and accurate" (p. 197) or "Mostly good". Hence, the submitted work was not entirely clear or good, but worth improving. Overall, "the most common pattern […] was the praise–criticism–suggestion triad" (F. Hyland & Hyland, 2001, p. 196) in the teacher comments. Furthermore, "praise–suggestion pairs" were used, as in "This is a good essay but you have to expand your ideas" (p. 196). Thus, instead of expressing bald criticism, as in "Poor spelling" (p. 194), the comments were typically formulated in a more indirect manner.

On the assessor's side, the preference for and utilization of explicit and indirect comments also result from the partly contradictory roles that teachers adopt in the classroom and review context. As F. Hyland and Hyland (2001) explain, teachers navigate multiple roles – of proofreader, facilitator, evaluator – in the feedback process and thus need to reconcile pedagogic with interpersonal goals (p. 187).

From the learners' side, however, previous studies produced mixed results about the impact of explicit and indirect comments on their perceptions, learning and revisions. While students valued encouragement (pp. 187–188), they also wanted to learn about their weaknesses (student in F. Hyland & Hyland, 2001, p. 202) and therefore desired constructive criticism (Ferris, 1995, cited in F. Hyland & Hyland, 2001, pp. 187–188), honest feedback and clear guidance (Carter & Kumar, 2017, quoted by Zheng et al., 2020, p. 194). For example, as Xu (2017) wrote in her self-reflection, "all imperative comments initiated changes, for [she] considered these strongly positioned comments as signs of severe defects in the supervisor's view, therefore must be remedied" (p. 250). Similarly, a participant in Zheng et al.'s (2020) study paid more attention to "explicit feedback that required a clear revision action" (p. 191; e.g. formulated as imperatives), whereas indirectly framed feedback might reduce "the perceived need to address the problem" (Wu & Schunn, 2021, p. 385, citing Patchan et al., 2016). In particular, they could consider feedback in the form of questions "intangible and confusing", as Ferris' (1997) study has shown (cited in Nurmukhamedov & Kim, 2010, p. 273).

Especially for foreign language learners who are not (yet) familiar with the pragmatic conventions in a particular linguistic or cultural community, such tentative language use can cause confusions and misunderstandings (F. Hyland & Hyland, 2001, pp. 206–207; Nurmukhamedov & Kim, 2010, p. 279). For instance, they could interpret hedged comments as alternative options, but not as directives for revision and appeals for improvement (see feedback functions in section 2.4.5). Accordingly, those comments could possibly be ignored or only have a minimal effect on students' revisions (Ferris, 1997, quoted in Nurmukhamedov & Kim, 2010, p. 273). In particular, feedback in the form of rhetorical questions (Yu et al., 2019, p. 62) or other

interrogative phrases lacking concrete recommendations might not be interpreted as a call for action (F. Hyland & Hyland, 2001, p. 206). This unawareness of the "discrepancies between the form and function" of the hedged comments (Nurmukhamedov & Kim, 2010, p. 279) can decrease the desired effects of constructive feedback (cf. F. Hyland & Hyland, 2001, p. 206), as students are unable to engage with the feedback as intended by the provider (Yu et al., 2019, p. 62).

On the syntactic level, it seems reasonable to analyze the usage of different sentence types in feedback comments. For example, Nurmukhamedov and Kim (2010) distinguished between comments as statements (identifying issues in the student's text), questions (expressing doubt or uncertainty towards the text), or imperatives (directly instructing the student to implement changes) (pp. 272, 275). In their research, imperative comments appeared effective for addressing errors in form rather than in content, whereas hedged comments and questions did not always prompt the desired revisions (Nurmukhamedov & Kim, 2010, p. 280; cf. the studies by Sugita, 2006, p. 37, cited by Nurmukhamedov & Kim, 2010, p. 273). They argued that students presumably "experience[d] difficulty interpreting these comments appropriately because of the difficulty in establishing a connection between the comment type's form and its pragmatic function" (Nurmukhamedov & Kim, 2010, p. 280). This challenge thus prevails with regard to indirect feedback on lexical and syntactic levels.

In that respect, the students' "limited English language proficiency" (Xu & Hu, 2020, p. 728) can pose mis- or non-understanding of indirect feedback (p. 729). Additionally, different regional varieties of English might cause confusion, for example due to different variants of Chinese English (Xu & Hu, 2020, pp. 730–731). On the one hand, it has therefore been argued that second- or foreign-language students encounter particular challenges in meeting the language demands of thesis writing (Zheng et al., 2020, p. 186, based on Bitchener & Basturkmen, 2006). On the other hand, scholars have reasoned that academic writing is not an innate register and thus has to be learned by first-language speakers and foreign-language learners alike (cf. e.g. Ferguson, 2007, p. 28). Some of the discrepant results in previous studies might derive from the specific contexts in which the studies were conducted. As opposed to EFL (English as a foreign language) settings, ESL students are exposed to the target language to a greater extent and might thus be more familiar with its pragmatic norms (Ferris, 1997, cited by Nurmukhamedov & Kim, 2010, p. 280). Additionally, different languages resort to distinct realizations of hedging, such as lexical or syntactic constructions (Nikula, 1997, p. 188), which can complicate their appropriate usage and interpretation in foreign-language communication.

Moreover, personal and cultural factors can be decisive. With regard to personal characteristics, for example, Young (2000, quoted in T. Wang & Li, 2011, p. 102) observed that students with higher self-esteem had positive attitudes towards feedback including criticism, whereas students with lower self-esteem even tended to perceive positive comments as negative. Cultural factors, in turn, will be dealt with in more detail in the next section.

2.4.8. Cultural Factors

Apart from linguistic aspects, prior research has given insights into the impact of students' cultural backgrounds on thesis writing and feedback. Generally, though, this is a field that needs more exploration (cf. T. Wang & Li, 2011, p. 101; Xu & Hu, 2020, p. 725), since the influence of culture might be multifaceted, possibly evolving with students' growing experience and differing along various stages of the thesis and supervision process, respectively.

Firstly, differences in academic conventions across disciplines and sociocultural contexts can pose challenges for international students and their supervisors (Bitchener et al., 2010, p. 81; T. Wang & Li, 2011, p. 103; Xu & Hu, 2020, p. 725). In that regard, students' perceptions of their teachers' role have implications on the understanding of hedged comments, for instance (see section 2.4.7 above). Notably, students with prior experiences of considerable power imbalances might anticipate high power discrepancies and thus approach published texts and supervisory feedback meticulously but uncritically (Bitchener et al., 2010, p. 81; Nurmukhamedov & Kim, 2010, p. 280). By contrast, supervisors might expect students' active and reflective engagement (cf. the review by T. Wang & Li, 2011, p. 103). This divergence has implications on whether feedback is proactively sought, how feedback is interpreted, how positive comments are viewed and how critical comments are handled (cf. T. Wang & Li, 2011, p. 109). Thus, comments might be closely attended to when teachers are seen as figures of authority, whereas they could be regarded as optional but not binding when feedback is seen as a negotiable space or expression of personal opinion (Nurmukhamedov & Kim, 2010, p. 280).

Often, these challenges have been researched among Chinese international doctoral students, who may adhere to cultural norms representing a "deference to authority" (Xu & Hu, 2020, p. 728). This contrasts sharply with the more egalitarian teacher-student relationships of many Western educational settings (Cortazzi & Jin, 1997, and Wang, 2008; both cited in T. Wang & Li, 2011, p. 103). However, such binary views could also produce or reinforce stereotypes (see Schluer & Liu, 2024), as cultures are developing dynamically, with individuals not necessarily representing or adhering to the norms of the culture they are supposedly part of. Generally, though, cultural predispositions might influence students' responses to (supervisory) feedback (T. Wang & Li, 2011, p. 103), but require more nuanced investigation and sensitivity. To exemplify, students from cultures that discourage open critique may find it challenging to engage with negative feedback critically, which in turn shapes both their reactions to criticism and their expectations regarding research supervision (T. Wang & Li, 2011, p. 109). In her reflexive account of her PhD journey, Xu (2017), for example, conceded that she "wrestled with the decisions between being obedient to listen to the supervisor and being critical and independent to do what [she] wanted to do" (p. 251). Supporting this observation, Chinese international PhD students quoted in the paper by Xu and Hu (2020) expressed the following views towards the feedback by their non-Chinese supervisors (p. 5):

- "All I learned in my past education in China is to respect and listen to the teachers. They are not supposed to be challenged and questioned." (Zhang)
- "I habitually follow the supervisors' feedback. They are the experts and authorities." (Zhao)

Xu (2017) further explained that she had to navigate and interact with her own culture as well as with the supervisor's expectations and institutional cultures (p. 250). This involved a complex process of "identity (re)construction", whereby different voices, beliefs and perceptions had to be (re)negotiated (Xu & Hu, 2020, p. 732). Consequently, Xu and Hu (2020) argued for "developing a more culturally-responsive and empowering intercultural pedagogy to facilitate international doctoral students' (re)construction of scholarly identity in feedback practice and academic writing, as well as in the wider context of intercultural doctoral supervision" (p. 724). Similarly, T. Wang and Li (2011) stressed that a willingness to learn about cultural aspects, awareness of cultural factors, their impact as well as an open and regular dialogue about role expectations and responsibilities would be essential (pp. 108–110; see section 2.4.2). They also recommended participation in professional development modules that are specifically devoted to these aspects (T. Wang & Li, 2011, p. 110; see e.g. Schluer, 2016). However, despite its relevance, research on international and intercultural thesis supervision is limited (T. Wang & Li, 2011, pp. 101, 103; Xu & Hu, 2020, p. 725), especially at Master level (cf. Neupane Bastola & Hu, 2023, p. 2) and in a larger variety of cultural contexts.

Moreover, attitudes towards and experiences with digital tools and digital feedback can differ and should therefore also be considered in the training of students and supervisors (cf. the review by Schluer & Liu, 2024). In that respect, Mohammed and AL-Jaberi (2021) noted that international graduate students might have been used to paper-based feedback approaches, whereas electronic feedback could be unfamiliar to them (p. 11). The authors therefore recommend conducting needs analyses to examine students' experiences with e-feedback (Mohammed & AL-Jaberi, 2021, p. 12). This certainly is not only true of international students but of any student, as there can be considerable individual variation concerning learners' prior experiences with digital feedback. In addition, tools and their features change over time, which necessitates continuous learning as well as regular inquiries into students' experiences and needs (Schluer, 2022a, pp. 238–249; 2024f). In the end, unfamiliarity with exploiting various features of different feedback tools can have consequences on the way feedback is provided and used (see section 2.6 for more details).

In summary, the interplay of cultural factors with academic conventions, power dynamics, and digital literacy underscores the complexity of feedback processes in thesis writing and supervision. As the previous sections have shown, feedback effectiveness ultimately depends on multiple factors, including teachers' and students' expectations and roles shaping interpersonal relations, learners' self-esteem and motivation, language proficiency, cultural

backgrounds (Saeed et al., 2021, 4) and familiarity with pragmatic conventions in feedback processes, the task type and evaluation purposes, the timing and technologies etc. (e.g. F. Hyland & Hyland, 2001, p. 188). These factors can lead to varied cognitive, affective, social and behavioral engagement, especially when indirect forms of feedback are used (Xu & Hu, 2020, p. 729; Yu et al., 2019, p. 62). Research on students' engagement with and responses to feedback will therefore be inspected next.

2.4.9. Engagement with and Responses to Feedback

The previous sections have underlined the significance of considering linguistic and cultural dimensions when designing feedback strategies, since different linguistic factors and cultural backgrounds may shape students' perceptions and responses to feedback in thesis writing contexts. This section will be devoted to the ways in which students can engage with and respond to feedback.

Engagement is a "multifaceted" and "malleable construct" (Fredricks et al., 2004, p. 59), as it is context-sensitive and dependent on people's interactions with the environment (p. 61). In dictionary definitions, it is often described as a kind of "commitment" and "involvement" (Fredricks et al., 2004, p. 60). Crucially, "[f]or feedback processes to be productive, students need to be involved actively in making sense of information and engaging with it for the purposes of ongoing improvement" (Carless, 2019, p. 713; see also Gan et al., 2025, p. 281). The level of engagement can vary along all subdimensions (Fredricks et al., 2004, p. 61) as well as across time and task, though.

In their recent review of research on Master thesis supervision, Grohnert et al. (2024) noted that students "experience mostly negative emotions in response to feedback" (p. 6). However, the field is not yet fully explored (Mohammed & AL-Jaberi, 2021, p. 1; Saeed et al., 2021, p. 2; see section 2.4.4). So far, researchers mostly adopted a tripartite framework to analyze Master students' and PhD candidates' responses to feedback by classifying them into cognitive, affective, and behavioral engagement (e.g. Mohammed & AL-Jaberi, 2021; Neupane Bastola & Hu, 2023; Yu et al., 2019; Zheng et al., 2020). This tripartite classification of interrelated dimensions had been proposed by Fredricks et al. (2004), but later been expanded to include a social dimension (Fredricks et al., 2016).

Cognitive engagement refers to the mental investments and operations students undertake when processing feedback and generating revisions (Yu et al., 2019, p. 51, with reference to Ellis, 2010; cf. Lu et al., 2024, p. 6, and the review by Mohammed & AL-Jaberi, 2021, p. 4). This may also include the cognitive coordination of information from different feedback sources and channels, such as peers, teachers and AI (Gan et al., 2025, p. 282). The dimension thus focuses on the ways students engage cognitively when trying to comprehend the messages conveyed in the feedback (including volition and thoughtfulness), regulating mental efforts during the interpretation of the feedback and generating revisions based on their cognitive

understanding (cf. Fredricks et al., 2016, p. 6; Gan et al., 2025, p. 282). Hence, it likewise comprises meta-cognitive procedures to regulate the mental processes and apply additional strategies, such as monitoring progress and enacting other facets of self-regulated learning (cf. Fredricks et al., 2004, p. 64; Yu et al., 2019, p. 51; see also the review by Neupane Bastola & Hu, 2023, p. 3). Accordingly, the literature often defined "cognitive engagement in terms of being strategic or self-regulating" (Fredricks et al., 2004, p. 64). A possible question to gain insights into this cognitive engagement is "[t]o what extent did you understand [the] feedback […]?" (Yu et al., 2019, p. 54) as well as to ask for explanations. In that respect, students could be requested to fill in a grid in which they specify the comment they are referring to, explain whether or in how far they will consider that comment and give reasons for (not) using it (cf. the "change tracker sheet" by Gießler, 2024, p. 436; see also Schluer & Maschke, 2025).

Affective (or emotional) engagement pertains to students' emotional and attitudinal responses to external feedback (e.g. by supervisors and peers) as well as their feelings during the feedback and revision process (Yu et al., 2019, p. 51; see also Gan et al., 2025, p. 283). This dimension consists of both positive and negative emotions (Fredricks et al., 2004, pp. 60, 63; 2016, pp. 5–6; Gan et al., 2025, p. 282). Examples include appreciation, interest, enthusiasm, pride, judgment, frustration, anger, sadness, boredom, and anxiety (cf. Fredricks et al., 2004, p. 63; 2016, p. 12; Gan et al., 2025, p. 283; Yu et al., 2019, pp. 51, 54; Zheng et al., 2020, p. 187). An obvious example for appreciation would be an expression of thanks, such as "Thank you, I really appreciate your comment" (cf. Saeed et al., 2021, p. 9). Other feelings might become discernible rather through non-verbal reactions, such as through smiling and nodding, or sighing and crying. Questions to learn more about students' affective engagement include "How did you feel upon receiving […] feedback on your first draft?" (Yu et al., 2019, p. 54) or "How did you feel about this comment/ revision?". Through a high emotional engagement, students could even experience the subjective state of flow, i.e. "complete involvement, whereby individuals are so involved in an activity that they lose awareness of time and space (Csikzentmihalyi, 1988)" (cited in Fredricks et al., 2004, p. 63). Students might also have different attitudes towards particular feedback sources. To exemplify, a student in Yu et al.'s (2019) study commented that, "[c]ombined with supervisor's feedback, peer feedback made me feel that my workload has been increased … (because) compared with supervisor's feedback, peer feedback was even more detailed" (p. 57). This can have implications on their engagement with and use of the feedback.

However, as learning is not just a solitary activity, but shaped by social interactions, collaborative approaches have become increasingly popular in education (cf. the review by Fredricks et al., 2016, pp. 6, 12). Accordingly, the **social engagement** dimension refers to students' (quality of) interactions with others, such as teachers and peers, during the learning (Finn & Zimmer, 2012, cited in Fredricks et al., 2016, p. 6) and feedback process (Gan et al., 2025, p. 282; Lu et al., 2024, p. 6). Engagement in peer feedback, peer teaching and peer learning

activities would be examples of this category, but also interest and investments in trying to understand others' perspectives, sharing own ideas with others as well as building on those ideas (Fredricks et al., 2016, pp. 10, 12). The engagement may thrive from a sense of belonging to a community of learners in which meanings are negotiated and knowledge is co-constructed (Gan et al., 2025, p. 283). However, it has been less researched as compared to the other dimensions, since it was added later to the engagement framework. The present work seeks to make a contribution to this by focusing on peer feedback processes.

Finally, **behavioral engagement** comprises students' revision operations and observable revisions as well as their action plans for future learning in response to the feedback they obtained (Han & Hyland, 2015; Zheng & Yu, 2018; both quoted by Yu et al., 2019, p. 51; see also Gan et al., 2025, p. 282; Lu et al., 2024, p. 6). Out of the four dimensions, it is considered as "the most observable" one (Zheng et al., 2020, p. 196). As noted, behavioral engagement often becomes directly visible in revisions, e.g. through deletions, insertions and other changes (Mohammed & AL-Jaberi, 2021, p. 4). However, it could also consist of ignoring the advice that was given (Zheng et al., 2020, p. 191). In that regard, Xu (2017) proposed a distinction between "active inaction", arising from "a careful cost–benefit analysis", and "passive resistance" stemming from a perceived problematic nature of the feedback (p. 253). Moreover, Xu and Hu (2020) looked at five Chinese international PhD students' revisions to language feedback and classified them as "(1) no revision (the feedback had not triggered any revision); (2) faithful revision (students applied the feedback faithfully into revision); (3) extended revision (students developed the feedback in revision); (4) self-initiated revision (there was revision but matching no explicit feedback)" (p. 727). These differentiations recognize the nuanced ways in which students may choose to engage or disengage with feedback. To gain insights about the motivations and reasons, teachers and researchers might ask questions such as "How did you use [the] […] feedback in your revisions?" (Yu et al., 2019, p. 54) or "Why did you ignore the following comment?" (see also metacognitive dimension above). In that respect, Zheng et al. (2020) observed in their study that students tended to implement explicit directive feedback rather than implicit suggestions (p. 191; see also section 2.4.7 on linguistic aspects). The indirect feedback was intended to prompt students' thinking and engagement (Zheng et al., 2020, pp. 191–192), which was eventually viewed as optional by the students, though. However, additional research is needed to explore students' reasons for (not) engaging with comments (Zheng et al., 2020, p. 196). Moreover, the impact of cognitive and metacognitive as well as social dimensions on behavioral engagement warrants further scrutiny.

Generally, encouraging students to comment on feedback appears beneficial, as it not only allows them to seek clarification but also to learn how to negotiate criticisms effectively (Saeed et al., 2021, p. 11, citing Carter & Kumar, 2017, and Li & Seale, 2007). This can contribute to more collaborative and communicative feedback processes, with students transforming from passive receivers to active respondents and knowledge seekers (Saeed et al., 2021, p. 12;

see peer model in section 2.4.2). It helps to make learning visible (Hattie, 2009, cited in Xu & Hu, 2020, p. 733) and simultaneously fosters learners' agency (Svalberg, 2009, quoted in Zheng et al., 2020, p. 187). A trustful and supportive classroom atmosphere as well as sufficient scaffolding (by teachers) can positively influence leaners' engagement across the different dimensions (Fredricks et al., 2004, p. 74; cf. Gan et al., 2025, p. 289), which highlights the importance of feedback training and coaching (see section 2.3.3).

While the above classification might be useful for analytical purposes, it should be noted that the dimensions often overlap in practice and mutually influence each other (Zheng et al., 2020, p. 196). For instance, social engagement might have an impact on cognitive, emotional and behavioral engagement, i.e. it could be a moderator variable of other engagement dimensions (Fredricks et al., 2016, p. 12). More recent research found all four dimensions to be "empirically distinguishable", at least in specific contexts of investigation (Gan et al., 2025, p. 289; see the "feedback engagement scale" by Gan et al., 2025, pp. 293–294). Additionally, Zheng et al. (2020) remarked that the influence of affective engagement on behavioral engagement might be mediated by cognitive engagement (p. 195). This suggests that students' decisions to act upon or ignore feedback may be influenced by their emotional responses. In addition, there can be differences in cognitive and behavioral engagement over time, as Grohnert et al. (2024, p. 6) have noted. Furthermore, the perceptions of the nature and source of feedback can be influential. Feedback engagement is less likely to occur if students do not perceive the comments as useful (cf. van der Kleij & Lipnevich, 2021, quoted by S. E. Rose et al., 2024, p. 2). In other words, "those who have more positive views of the feedback they receive are more likely to report greater engagement with the feedback" (S. E. Rose et al., 2024, p. 9). This correlation appeared to be partially mediated by students' identification as a learner (S. E. Rose et al., 2024, pp. 8–9), "specifically, their belief that they are responsible for their own learning" (p. 11).

Overall, opportunities to reflect on and utilize feedback as part of the pedagogical design as well as the use of different communication channels and tools might contribute to students' motivation and engagement (X. Sun & Trent, 2022, p. 394). As compared to supervisory feedback, though, less is known about engagement with peer feedback in research planning and thesis writing. To lay a foundation for the examination, the next section will outline central steps in the research process.

2.5. Research Planning and Academic Writing

The Master thesis is a central requirement for the completion of postgraduate studies (Grohnert et al., 2024, p. 1) and for many students the first independent research project they undertake (Neupane Bastola, 2021, p. 565). Even more so, the PhD thesis is highly demanding, given the increased complexity of the research endeavor. Skills in research planning and project management, including time management and problem-solving, therefore become important (Grohnert et al., 2024, p. 2) in addition to effective writing, communication and negotiation skills (Perce,

1998). In the following sections, a general overview of the different phases of the research (planning) process will be provided (section 2.5.1) before they will be elaborated in more detail (sections 2.5.2 to 2.5.4).

2.5.1. Phases of the Research (Planning) Process

While students usually learn about academic writing and research methods in their studies, the Master thesis often is the first time they put this knowledge into practice as part of a complex project that spans several months (see the review by Grohnert et al., 2024, p. 2; Neupane Bastola, 2021, p. 565). Given the challenges that Master students and PhD writers might encounter, this process should ideally be accompanied by regular opportunities for feedback. For instance, Woodrow (2020) highlighted that feedback is crucial at several stages of the thesis and dissertation process, including the (1) determination of the topic, (2) literature review, (3) initial and refined draft of the research design, (4) research proposal (presentation and subsequent written proposal), (5) instrumentation and methodological procedure, (6) thesis writing, and (7) assessment (pp. 66–67). Similarly, Wagner et al. (2012) outlined seven steps: (1) statement of the problem, (2) development of the research question, (3) relevant review of the literature, (4) choice of theoretical approach, (5) choice of methodology and method, selecting a sample, (6) data analysis and interpretation, (7) discussion and report writing (pp. 13–14). While there are slight variations in the labelling of the stages and numerous possible research designs overall, there seems to be general agreement about the first important step, which is the determination and delimitation of the topic, along with the formulation of a central (research) question, as this affects all subsequent phases (see Schluer, 2016). Accordingly, most general reference works dealing with the research (planning) process cite the following basic steps that are commonly adopted (cf. e.g. Creswell, 2014; Creswell & Creswell, 2023; Paltridge & Phakiti, 2018; Woodrow, 2020):

(1) **Topic Selection**: Brainstorming about possible topics and selecting the one that appears suitable. This step often includes doing a preliminary search for relevant information and locating materials related to the chosen topic.
(2) **Literature Review**: Conducting a thorough review of existing literature to understand the current state of the field and identify gaps in knowledge. In that respect, it is important to assess the quality and reliability of the sources.
(3) **Specifying the Research Problem**: Clearly defining the research question(s) or problem.
(4) **Choosing a Research Approach**: Selecting an appropriate research approach to tackle the research question(s), i.e. whether it should be quantitative, qualitative, or mixed methods, based on the nature of the research problem.
(5) **Ethical Considerations**: Addressing ethical issues related to the research, such as informed consent and confidentiality, especially when working with human subjects.

(6) **Preparing the Implementation**: Developing the data collection instruments and familiarizing oneself with relevant analytical techniques, while ensuring that they align with the chosen research approach; Planning the implementation of the procedures and setting deadlines for the single steps, including sufficient time for unforeseen delays, e.g. to obtain the necessary permissions or to collect data from the participants; Conducting a pilot study to avoid errors and overcome obstacles for the main study.
(7) **Data Collection and Analysis**: Collecting data from the participants and applying adequate analytical techniques.
(8) **Writing and Publishing**: Considering how the research findings will be communicated and published, following the specific guidelines and expectations of the field. This step involves making outlines, taking notes, and structuring the information gathered during the research phase.

Even though the enumeration might give the impression of a sequential procedure, the work on the different stages is often iterative and cyclical in nature (Paltridge & Phakiti, 2018, p. 259). Similar to the interlocking phases of the academic writing process (see section 2.5.4), not only previous stages influence later ones, but also later stages might have an impact on preceding ones (cf. Paltridge & Phakiti, 2018, p. 260). The next sections will elaborate on some key phases to identify their characteristics and decide on suitable digital peer feedback methods in the subsequent step of pedagogical planning (section 2.6).

2.5.2. Topic Search and Development of Research Questions

The first step of the research process commonly consists of an orientation phase in which students choose a suitable **topic** that is feasible in view of the available time and resources (Creswell & Creswell, 2023, pp. 26–28; Paltridge & Phakiti, 2018, p. 260; see Woodrow, 2020, chapter 2). This phase is often challenging for students (Woodrow, 2020, p. 11), since inadequate choices can cause frustrations and delays in the entire research process. To this end, Paltridge and Phakiti (2018) outline three important criteria, which are originality, worthiness, and feasibility (pp. 269–270). Originality means that a topic has not yet or not thoroughly been researched before, or that it has not been studied in a particular context (e.g. different sociocultural or institutional setting) or will be investigated via new or revised data collection instruments (Paltridge & Phakiti, 2018, p. 269). Worthiness is determined by its likely outcomes, i.e. in how far the findings might help to solve a practical problem or bring clarity into an underresearched field (ibid.).

Finally, feasibility is a crucial factor, especially for Master and PhD students, as the topic needs to be manageable within a limited time frame and with the restricted resources that are available for conducting the research (Paltridge & Phakiti, 2018, p. 270; see also Woodrow, 2020, p. 14). Access to the research site and finding a sufficient number of participants are

common obstacles that students should consider early in the research planning process (Woodrow, 2020, p. 15). For reasons of availability, university students frequently constitute the target population of Master theses (Woodrow, 2020, p. 14). However, the inherent biases of such a procedure need to be acknowledged and reflected on by the thesis authors. Also, the researcher's skills influence the feasibility of a research project (Paltridge & Phakiti, 2018, p. 270), which means that student researchers must either possess or be able to acquire the relevant skills (e.g. for survey development and statistical analysis) within the given time frame.

To determine such a researchable topic, students usually brainstorm possible topics arising from their previous courses, personal experience, and/ or from reading the literature (Paltridge & Phakiti, 2018, p. 260; Woodrow, 2020, pp. 11–14). At this point, they often obtain advice from their supervisor (Paltridge & Phakiti, 2018, p. 271). However, fellow students can likewise offer recommendations or identify potential obstacles at this early stage, as suggested in the present project. Moreover, the topic will be narrowed down further through a thorough literature review that can lead to a specific research gap and research questions (Creswell & Creswell, 2023, pp. 27–28; Paltridge & Phakiti, 2018, p. 263; see also Woodrow, 2020, pp. 6, 119).

Reviewing the literature means browsing suitable databases (web and library catalogues) and identifying relevant as well as reliable resources (cf. Creswell & Creswell, 2023, pp. 32–37). This process typically involves searches about the key terms or constructs to be investigated, the theories that have been advanced and developed over time, as well as the studies that have already been conducted, including their aims, contexts, research questions and instruments, analytical procedures and findings (Paltridge & Phakiti, 2018, p. 261). It commonly starts with "a broad review of the literature" to gain essential background knowledge and draft preliminary definitions of the central terms (e.g. through introductory textbooks, handbooks, and encyclopedias) (Woodrow, 2020, p. 22; see also Creswell & Creswell, 2023, p. 36). Key terms are those notions "that readers will need to understand [the] proposed […] project" and should be defined upon first mention in the running text (Creswell & Creswell, 2023, p. 44). Subsequently, the available research literature will be scrutinized in more detail, often starting with review articles (if available), the tracking of the original literature, as well as frequently cited studies and current work published in relevant journals (cf. Creswell & Creswell, 2023, pp. 36–37).

A thorough and critical literature review is beneficial to gain a better understanding of the current state of knowledge, commonly used methods and still prevailing gaps or debates in order to arrive at or refine the research questions for the proposed study (cf. Ary et al., 2006, cited in Paltridge & Phakiti, 2018, p. 261). It will help to situate the present topic within the body of available research and underscore its contribution to the ongoing scholarly dialogue (Creswell & Creswell, 2023, p. 28). It often has a funnel-like structure, starting with a broader contextualization to establishing a research gap (Creswell & Creswell, 2023, p. 29; cf. Woodrow, 2020, p. 119; see the hour-glass model by Judd et al., 1991, p. 456).

Given the mass of literature that is available for most research fields, it is important for students to keep track of their reading, e.g. by resorting to reference management software and/ or using a Word file, Excel table or other program (e.g. MAXQDA) to categorize the literature according to inductively or deductively derived criteria (Woodrow, 2020, pp. 26–27). These criteria for clustering the previous literature often comprise the research gaps that were addressed, the theoretical frameworks and methods that were employed, and the central findings that were obtained in the existing studies (Woodrow, 2020, p. 27), but also further categories that arise from the specific type of problem students want to inquire about. Furthermore, depending on the nature of the planned research and the available literature, the written review can be of different kinds, such as a qualitative and quantitative (Creswell & Creswell, 2023, pp. 29–32), historical, conceptual or contrastive review (Paltridge & Phakiti, 2018, p. 262). To facilitate the planning of the written review, Creswell and Creswell (2023) suggest drafting a "literature map", which is a visual representation or chart of the relevant literature (pp. 39–42). Therein, the research topic is positioned within the web of available research, which could be organized in different ways (e.g. hierarchical structure, flowchart) (pp. 40–42). Especially on digital boards (see section 2.6.3), flexible re-arrangements will be facilitated, and pertinent resources could be incorporated or hyperlinked. The map and its branches will also visually demonstrate which areas have already received sufficient research attention and which of them need further examination (cf. Creswell & Creswell, 2023, p. 41).

Based on this review, the **research problem** or research focus will be delimited (Paltridge & Phakiti, 2018, p. 263). It is the **gap** that emerges from the literature review and that will be addressed by the proposed research (Creswell & Creswell, 2023, p. 29; Paltridge & Phakiti, 2018, p. 263). It is commonly stated towards the end of the literature review in the written thesis (cf. Paltridge & Phakiti, 2018, p. 263) and should clarify "how the proposed study adds to, extends, or replicates research [already] completed" (Creswell & Creswell, 2023, p. 39).

Related to that, concrete **research questions** (and hypotheses) will be derived that need to be "both worth asking and capable of being answered" (Paltridge & Phakiti, 2018, p. 273). Depending on the scope of the proposed study, they could also consist of central questions and associated subquestions (Creswell & Creswell, 2023, pp. 146–147). Generally, different types of research questions (RQs) are possible, such as descriptive, relational, causal, and evaluative (Woodrow, 2020, pp. 55–56). Descriptive RQs aim to describe an existing situation and are often found in qualitative research (Woodrow, 2020, pp. 55–56). Relational RQs seek to compare two or more groups or variables, while causal RQs strive to determine cause-and-effect relationships (p. 56). Besides, evaluative RQs inquire into participants' perceptions of an intervention or phenomenon (p. 56). Accordingly, an adequate question word needs to be selected (p. 56). While simple "is/are" or "do/does" questions could be used for any of the three types, the downside is that they will lead to "yes/no" answers, which might be unsatisfactory as a research result (p. 56). For instance, a question like "Is there a difference between intermediate and

advanced learners of … with regard to …?" represents a relational RQ and would result in a "yes or no" response. However, it would not inquire into the nature or extent of the difference. Thus, the question could be reformulated as "What is the difference between …?" or "To what extent do intermediate and advanced learners differ with regard to …?" Furthermore, for descriptive RQs, the question words "What strategies …?" or "Which strategies (from a specific set of strategies) do students use when …?" would be fitting. For evaluative RQs, "How" might be suitable, as in "How effective is strategy training in students' point of view?" These question words would lead to a more detailed account of the results than binary question words would do (Woodrow, 2020, p. 57). As Creswell (2014)[3] noted, "what" or "how" questions would particularly be suitable for an open or emergent and typically qualitative research design ("understanding how things occur"), whereas "why" questions seek to elicit explanations or cause-and-effect relationships and are therefore mostly associated with causal RQs in quantitative research.

2.5.3. Methodology and Research Plan

In accordance with the research question(s), an appropriate methodology and specific research methods have to be identified and justified (Paltridge & Phakiti, 2018, pp. 265, 267, 271; Woodrow, 2020, pp. 6, 57). **Methodology** means the research approach, with a common distinction being made between quantitative, qualitative, and mixed methods research (Woodrow, 2020, p. 32). By contrast, **methods** refer to the concrete procedures that are used to gather and examine the data (for an overview and examples see e.g. Creswell & Creswell, 2023, chapters 8–10). Guiding questions during this planning process (see Paltridge & Phakiti, 2018, p. 271) include the following: What types of data might help to answer the research question? What methods can be used to collect these data? How could the data be analyzed? The foregoing literature review might have already informed the students about suitable research methods in earlier studies (Paltridge & Phakiti, 2018, p. 265), but also about the methods that have been underused so far but appeared to be promising. Furthermore, students should develop an understanding of the strengths as well as weaknesses of different methods in order to craft a suitable research design (Paltridge & Phakiti, 2018, p. 275). In that regard, Woodrow (2020, pp. 57–58) suggests setting up a table in which the connections between the RQs and methods for data collection as well as analysis are explicated. For instance, RQs inquiring into teachers' attitudes and perceptions might be elicited via semi-structured interviews, which in turn would be analyzed by using thematic analysis.

Moreover, students need to consider how they could ensure the validity and reliability of their research. Validity refers to accuracy, i.e. whether the study measures what it claims to measure (Woodrow, 2020, pp. 46, 138). Reliability, in turn, relates to replicability, i.e. "whether

[3] These elaborations are only mentioned in Creswell's (2014) extended version published by SAGE in the United States, whereas the remaining citations stem from the International Student Edition printed in the UK that is provided the list of references.

similar results would be achieved if the research was repeated" (Woodrow, 2020, p. 46). There are different possible measures of reliability and validity in quantitative and qualitative research (see e.g. Woodrow, 2020, p. 47). For example, the triangulation of data from different sources (surveys, document analyses) can heighten the validity of qualitative research (Creswell, 2014, p. 201; Creswell & Creswell, 2023, p. 213). Likewise, a reflection about potential researcher biases appears particularly important in qualitative research (cf. Creswell & Creswell, 2023, p. 214; see also section 3.11).

Crucially, students also need to be aware of research ethics and follow the necessary steps, such as asking for relevant permissions and obtaining informed consent from the participants (see e.g. Creswell & Creswell, 2023, p. 96). Students should also show awareness of the limitations of their study as well as of potential hindrances that could occur during the research process (cf. Paltridge & Phakiti, 2018, p. 270; Woodrow, 2020, p. 46).

Based on these considerations, a preliminary **research plan** should be set up (cf. Paltridge & Phakiti, 2018, p. 271). It is recommended to sketch a concrete timeline that appears manageable and will ideally be adhered to (cf. Woodrow, 2020, p. 58). At this point, students should already have ensured access to the research site by having contacted relevant persons (Woodrow, 2020, p. 58) and asked for official permissions (e.g. teachers, headmasters, ministries). Also, they need to allocate time for the piloting of the data collection procedure (cf. Woodrow, 2020, pp. 81, 84).

At this stage, many universities and supervisors request a **research proposal** from each thesis writer (cf. Woodrow, 2020, p. 6), which demonstrates students' knowledge and awareness of the above-mentioned aspects. In that document (or earlier), students should also formulate a (working) title for their thesis, as it helps to set a focus and serves as a guide for the planned procedure (Woodrow, 2020, p. 16). Moreover, key terms need to be defined and operationalized for data collection and analysis. The appendix of the proposal could also contain a draft of the research instruments, e.g. survey or interview questions (cf. Creswell & Creswell, 2023, p. 165).

Subsequent phases consist of **data collection** and **analysis** (Paltridge & Phakiti, 2018, pp. 267–268). Depending on the chosen methodology, this can comprise numerous steps and research cycles. Often, the collected data need to be prepared for analysis, e.g. through the transcription and anonymization of interview data, before the coding can occur (Paltridge & Phakiti, 2018, p. 267). Since these processes starkly depend on the chosen methods and research focus, they will not be elaborated further at this point.

2.5.4. Academic Writing

Writing plays a key role throughout the research process and requires students to analyze, evaluate, support, and synthesize theoretical information and research evidence (Ariyanti, 2016). Eventually, it culminates in the submission of the finalized thesis for review by the supervisors

and examination board. While writing is often positioned last in sequential descriptions of the research process, it is actually relevant at each phase and should therefore start as early as possible (Creswell & Creswell, 2023, pp. 84–86). Consequently, writing is to be considered as "an integral part" of the learning and research process (Woodrow, 2020, p. 107). Likewise, the other phases cannot be strictly separated from one another, as decisions at one phase have an impact on subsequent steps and might even influence previous ones (see Schluer, 2016, p. 450). Hence, the process is not linear (Flower & Hayes, 1981, p. 367), but is characterized by back-and-forth movements and continuous modifications in light of new evidence.

More specifically, the writing process model that Flower and Hayes (1981) proposed foregrounds the mental processes that writers engage in (p. 367). In that respect, they distinguished between three major processes, which are (1) planning, (2) translating, and (3) reviewing (see illustration by Flower & Hayes, 1981, p. 370). Planning consists of several subprocesses, notably generating ideas, organizing them, and setting goals (pp. 370, 372). In fact, the determination of the writing or project objective and of the different steps involved is a crucial first step. The second and main part of the process is named "translating" by Flower and Hayes (1981), as the writers are metaphorically translating and transcribing their ideas into words. It is followed by the step of "reviewing", which pursues the primary aim of evaluating and revising the written output (Flower & Hayes, 1981, p. 374).

This whole process should be accompanied by a fourth process called "monitoring" (Flower & Hayes, 1981, p. 370). It can lead to cyclical reiterations at any point. For example, revisions can occur at any time of the writing process, which could in turn result in a re-planning and re-visioning of the ideas (Flower & Hayes, 1981, p. 376). To revise something, the writers need to be able to diagnose problems and select suitable strategies to remedy them (Wu & Schunn, 2021, p. 367). As Flower and Hayes (1981) explain, "writers are constantly planning (pre-writing) and revising (re-writing) as they compose (write), not in clean-cut stages" (p. 367). For example, the detection or release of new publications (and thus new theories, frameworks, models and empirical findings) can lead to additional points or even substantial revisions of the literature review. Similarly, the planned implementation of the research might require modifications as soon as contextual parameters change (e.g. availability of participant group, need for online teaching instead of on-site teaching). This, in turn, can have repercussions on the description of the methodological framework, the instruments used, and the analytical approach. Moreover, the collected data can prompt additional literature searches about previously unknown or disregarded aspects. They might not only contribute to (re-)shaping the theoretical part and sharpening the research gap, but also influence the arguments adduced in the discussion of the empirical findings. It thus becomes clear that the actions performed at each step of the research process have implications for the contents of the final paper. Altogether, then, the research process (Paltridge & Phakiti, 2018, p. 259; see illustration by Schluer, 2016, p. 450) as well as the academic writing process (Coffin et al., 2003, p. 34) need to be seen as cyclical.

Since the TESOL Research Colloquium terminates with the presentation of the research proposal, the first four phases as specified by Woodrow (2020, pp. 66–67) will be focused on in the present study, exploring in how far digital feedback processes can support students in completing these steps. The next section will therefore introduce several digital feedback methods that might be employed at different phases of the research planning process.

2.6. Digital Feedback

Digital feedback can be exchanged in multifaceted ways by resorting to numerous tools with unique features that might be suitable for specific learning objectives (see Schluer, 2022a). In essence, digital feedback refers to the use of technologies, including software programs and apps, to seek, create and use comments, corrections and suggestions. These can stem from the teacher, a peer, the learners themselves or a pre-trained program (e.g. an AI-powered chatbot or correction software). In her book, Schluer (2022a) categorized the plethora of possibilities into fifteen digital feedback methods that were expanded to a total of nineteen options on the "Digital Feedback Map" (Schluer, 2023a; see https://tinyurl.com/DigitalFeedbackOverview): text-editor feedback, cloud-editor feedback, digital board feedback, blog feedback, forum feedback, wiki feedback, e-portfolio feedback, audio feedback, talking-head video feedback, screencast feedback, chat feedback, video conference feedback, social media feedback, live poll feedback (ARS), survey feedback, email feedback, automated writing evaluation (AWE), chatbot feedback, and robot-assisted feedback. They can be classified into synchronous and/ or asynchronous feedback, as defined in the next subsection (section 2.6.1).

Crucially, the various methods and tools have differing affordances and limitations that influence their suitability for different feedback purposes at the various stages of the research planning process. For each of them, a huge variety of possible digital tools with their distinct features can be employed, which might facilitate or constrain feedback processes to varying extents (see socio-material theories in section 2.1; e.g. Tai et al., 2023, p. 202). For instance, the feedback modes and tools can influence students' engagement (see section 2.4.9) and agency, result in different ways of using language (section 2.4.7) and affect the interpersonal dimension (Ebadi & Dadgar, 2024, p. 161). To make adequate choices of suitable digital methods and tools, educators and learners need to be aware of their characteristic features and resultant affordances as well as limitations. Selected digital feedback methods will be reviewed in more detail in sections 2.6.2 to 2.6.5, complemented by additional considerations about their pedagogical integration (section 2.6.6). This will lay the foundation for the feedback interventions that are investigated in the present work.

2.6.1. Synchronous and Asynchronous Digital Feedback

Innovative digital feedback methods can motivate learners, not only due to their novelty, but primarily through their manifold affordances, such as their convenient availability, interactivity,

and enhanced speed of exchange (see the review by Schluer, 2022a). Frequently, a distinction has been made regarding the timing of the feedback, since some tools allow for either synchronous (real-time) or asynchronous (time-delayed) feedback exchanges or both (Ahmed et al., 2021, p. 293).

It has been argued that **asynchronous** methods can lead to deeper reflections (Rath, 2025, p. 2) and more detailed feedback, as they empower students to process the texts and provide feedback at their own pace without the pressure to respond immediately (cf. C.-F. Chang, 2012, pp. 72–73; J. Chen & Bogachenko, 2023, p. 9936; Zhan et al., 2022, p. 6). Examples include commenting in offline text-editors, contributions in online forums or e-mail writing (see Schluer, 2022a). Moreover, digitally recorded feedback represents another variant of asynchronous feedback, as for instance in the form of audiocasts, screencasts, talking-head videos or combination screencasts with talking head (Mahoney et al., 2019; Schluer, 2022a, p. 53). Overall, however, the downside is that the delay in response times decreases interactivity, i.e. it can reduce the amount of follow-up interactions and negotiations (cf. Guardado & Shi, 2007, p. 444; Liou & Peng, 2009, p. 516; J. Liu & Sadler, 2003).

By contrast, **synchronous** modes allow students to exchange immediate feedback (Ahmed et al., 2021, pp. 293–294), e.g. through cloud-based editing applications or videoconferencing (Schluer, 2022a). Often, the apps enable multimodal interactions through writing, voice, and video. They might also encourage several loops of interaction, which can be fruitful to clarify meanings and deepen the contents of the feedback conversation.

Due to their distinct advantages, it might make sense to allocate asynchronous and synchronous methods to the different phases of the inverted classroom approach (Lage et al., 2000), with asynchronous feedback mostly taking place in preparation for a live session so that students may work at their own pace when providing feedback to their peers. This could also encourage greater depth in reflection and in feedback quality. During the synchronous sessions, then, learners can elaborate on the comments they have provided asynchronously to clarify understandings and negotiate meanings. The integration of the feedback into their own work in progress could occur subsequent to the live session and in preparation for the next meeting, respectively, and thus result in a spiral curriculum (see sections 3.1 and 3.4 for details).

Furthermore, it should be noted that some tools, such as digital boards or online word processors, permit both synchronous and asynchronous commenting (see Schluer, 2022a, p. 92). Additionally, combinations of different tools in digital and non-digital modes offer further opportunities. They might help to overcome the limitations of single feedback formats (cf. Ahmed et al., 2021, p. 311; Ryan et al., 2019, p. 1508) and support learners in a more effective and engaging way. However, empirical evidence and practical advice for choosing and using feedback methods appropriately is limited (Schluer, 2022a), especially with regard to peer feedback in online, blended or hybrid learning environments (see the review by Schluer & Liu, 2024, concerning peer feedback in intercultural online communication).

Notably, there is hardly any research nor best practice advice for the appropriate selection of digital feedback methods at different stages of the research planning and academic writing process. Most studies centered on feedback practices in undergraduate courses, while those at Master and PhD levels have received less attention (Swartz & Gachago, 2018; see sections 2.4.3 and 2.4.4), particularly in blended or digital learning spaces. The present intervention intends to fill this gap, as will be explained below (section 2.7).

The next sections briefly review the digital feedback methods that were utilized for peer feedback purposes in the current study. Since most prior research used online collaborative tools for peer feedback on writing (Yusof et al., 2012), in particular cloud-editing applications like Google Docs (cf. M. A. Alharbi, 2020; Hedin, 2012; Wood, 2023), this feedback method will be described first in section 2.6.2. For other stages and tasks in the research planning process, different digital formats and tools might be more suitable, though. Sections 2.6.3 to 2.6.5 will therefore introduce digital boards, recorded feedback, and online forums, respectively.

2.6.2. Cloud-Editor Feedback

There are numerous possibilities for collaborative writing and peer feedback, in particular via wikis and online word processors (Dawson et al., 2023, pp. 707, 718). Each program offers a range of functions, some of which are shared across tools, whereas others are peculiar to a software application (e.g. Aldawi & Maher, 2023, p. 266; Laflen, 2023). These distinct tools, even if they are employed for the same feedback purpose and mode (here: written feedback), might be perceived and used differently by teachers and students (see the study by Laflen, 2023). Thus, different cloud editors, such as Google Docs, Microsoft Word (Laflen, 2023, p. 2) or Tencent Docs (Y. Li, 2023), can differ in their suitability for concrete feedback purposes and learning environments. Some basic functions are, however, usually common across programs, such as the possibility of inserting marginal comments and text edits (cf. Laflen, 2023, p. 10) with or without time delay and flexibly accessing the online documents from any place (cf. Screti, 2023, p. 169; Woo et al., 2013, cited in Dawson et al., 2023, p. 719).

In that regard, **cloud-editor feedback** can be defined as an interactive feedback method drawing on cloud-based online editors that enable synchronous as well as asynchronous collaborative exchanges (cf. Schluer, 2022a, p. 92). This feedback format appears to be particularly suitable for formative, in-process support by instructors and peers (Aydawati, 2019; Y. Li, 2023, pp. 2, 9; Saeed & Al Qunayeer, 2020; Shintani & Aubrey, 2016, p. 296). Due to the editing functions, cloud editors are mostly used to provide feedback on written tasks, such as essays, term papers, or research proposals. While “Google Docs is a free online word processor” (Aldawi & Maher, 2023, p. 266), there are also other applications in the office suite, such as Google Slides, that could be utilized for collaborative work on other task types. Notably, Google Slides allows for the insertion of multimedia elements, making it suitable for presentations or other interactive tasks (Kusumaningrum & Pratiwi, 2024, pp. 81–82).

Online editors and other collaborative applications consequently enable interactive feedback by several individuals who edit and comment simultaneously (cf. M. A. Alharbi, 2020; Aubrey, 2014, 47; Shintani & Aubrey, 2016, p. 296). The changes become immediately visible but can also be accessed and revisited asynchronously (Schluer, 2022a, p. 94). Reviewers thus have time to think deeply about the aspects they want to address, i.e. what parts they want to criticize or comment on (Ebadi & Rahimi, 2017, p. 807; Farahian & Noori, 2023, p. 117), and how they want to do it, which can eventually lead to a higher feedback quality. Similarly, recipients can access and answer the feedback at their own pace (Sullivan, 2020, p. 669).

The comments might relate to global or local aspects of writing, i.e. higher-order aspects of content, argumentation and organization on the one hand, and lower-order aspects including spelling and punctuation as well as grammar and word choice on the other hand (M. A. Alharbi, 2020, p. 235). Regarding the latter, auto-corrections in online word processors can accelerate the feedback process. In that respect, Susilawati et al. (2024) studied auto-generated and human feedback in Google Docs. Auto-generated feedback helped to "spo[t] errors in spelling, grammar, or punctuation", whereas the commenting feature was used for human-generated feedback "to give students suggestions on content, writing style, diction, and letter structure or organization" (Susilawati et al., 2024, p. 200). Accordingly, it appears that automated and human feedback can serve complementary purposes, giving the reviewers more time to "focu[s] on feedback for content and context" (Susilawati et al., 2024, pp. 201–202; cf. Nergiz Kartepe & Atmaca, 2024, p. 161). However, the automated suggestions also need to be inspected critically concerning their correctness (see Schluer, 2022a, p. 90), for instance by engaging in peer dialogues (cf. Schluer & Maschke, 2025).

Hence, through commenting and reply features, conversational feedback exchanges between assessors and authors can be created in the cloud (Fuccio, 2014, p. 216; Saeed & Al Qunayeer, 2020). Likewise, for peer feedback, Wood (2023) noted that "extended discussions of highlighted excerpts of a text over time encouraged agentic engagement in a high-quality peer feedback process" (p. 341). In fact, learners can obtain feedback from various persons at the same time (Schluer, 2022a, p. 94), which can additionally be supported by a simultaneous chat function available on Google Docs, for instance (Aldawi & Maher, 2023, p. 267; Aubrey, 2014, p. 49; Schluer, 2022a, p. 101). On the downside, a high number of comments (in different places) might confuse or overburden the feedback recipients, especially with multiple peer-reviewers (cf. Cui & Schunn, 2024, p. 10, in section 2.3.2). In particular, the immediacy of commenting may lead to many disconnected and "spontaneous remarks, which could decrease their value and usability" (Schluer, 2022a, p. 98). The utilization of cloud editors for feedback purposes thus necessitates pedagogical forethought as well as sufficient training and good organization of the peer process.

Additionally, data loss is a potential concern (Schluer, 2022a, p. 97), as each user of the cloud document can edit or delete each other's content, depending on the settings that are

chosen. On the other hand, some online editors, such as Google Docs, offer an autosaving function (Screti, 2023, p. 169) and revision history (Ebadi & Rahimi, 2017, p. 789; Hang, 2023, p. 55; Yang, 2010, quoted by M. A. Alharbi, 2020, p. 239), which allows learners and teachers to track changes systematically (M. A. Alharbi, 2020, p. 235; Fuccio, 2014; Hang, 2023, p. 55). Moreover, Google Docs usually sends a notification to the author's mail account once a comment has been inserted or resolved (Aubrey, 2014, p. 51). In that regard, the 'resolve' button has been considered a useful feature by feedback recipients in order to tick off comments and monitor revisions (Aubrey, 2014, p. 51; cf. Laflen, 2023, p. 11). Some students might, however, be unaware of the alert and reply functions, which could thus hamper interactions (see Karanjakwut & Tiang-uan, 2024, pp. 36, 39).

Furthermore, teachers can monitor peer-review processes on the cloud and possibly provide further advice in the comments or via the chat (Aubrey, 2014, p. 47). In that respect, Screti (2023) remarked that some students might feel "stressed about being watched" (p. 153), though. This, however, rather constitutes a general challenge of an open feedback and learning environment (see section 3.3) and can be overcome by carefully introducing students to its benefits and the changed role of the teacher as facilitator and collaborator striving to support students rather than proctoring them (Screti, 2023, p. 170). Likewise, the necessity of a stable internet connection applies to other synchronous digital tools as well (Aubrey, 2014, p. 53).

Compared to feedback in separate files or via emails, a major advantage of editing tools, however, is that feedback recipients can easily locate the areas the comments refer to because they are directly connected to specific passages in the online document (Fuccio, 2014, p. 209) – similar to feedback in offline word processors. Also, the combined affordances of synchronous and asynchronous access permit learners to immediately revise errors and consolidate new knowledge by applying it to similar sentences or assignments later on. Indeed, previous studies by M. A. Alharbi (2020), Aydawati (2019) as well as Ebadi and Rahimi (2017) found that feedback on Google Docs had positive effects on writing skills. Furthermore, some studies observed enhanced self-efficacy (Aldossary, 2024, p. 3984) and higher student engagement, respectively (Farahian & Noori, 2023, p. 116; Hemati & Farahian, 2024, p. 14). While cloud editors thus appear useful for text tasks, the insertion of multimedia elements is usually restricted, not only due to the limited scope of functions of a specific editing application, but also due to the available cloud space (cf. Firth & Mesureur, 2010, p. 3; Saeed & Al Qunayeer, 2020, p. 9; see review by Schluer, 2022a, pp. 97–99). Digital boards, in turn, facilitate the incorporation of various media and also led to positive results (e.g. J. Pearson, 2021, regarding Padlet), as the next section will elucidate.

2.6.3. Digital Board Feedback

Digital board feedback refers to the utilization of an online collaborative bulletin board-like platform for the interactive exchange of comments, corrections and suggestions (cf. Schluer,

2023a). These applications have been named variously in the prior literature, including “digital pinboard[s]” (Rath, 2025, p. 1), “virtual wall[s]” (Albarqi, 2023, p. 185), “interactive boards” (Rudenko et al., 2024, p. 332), “digital whiteboards” (Yesmin & Siddique, 2023, p. 2) or “collaborative digital whiteboards” (University of Miami, 2025, n.p.). Much of the cited literature utilized Padlet (e.g. Albarqi, 2023; Gießler & Olejniczak, 2024; Aisyah et al., 2024; McLachlan & Tippett, 2024; D. M. T. Nguyen & Trang, 2023; Rath, 2025; Rudenko et al., 2024; A. B. P. Sari, 2019; Sugiarni & Firdaus, 2024) or similar tools, such as Google Jamboard (University of Miami, 2025, n.p.; Yesmin & Siddique, 2023), Miro (University of Miami, 2025, n.p.) or Trello (Rudenko et al., 2024). They are commonly used for brainstorming and mind-mapping purposes whereby learners take notes and organize contents, respectively (Beal & Hontvedt, 2023, p. 3; Buzan, 1993, cited by Al Naqbi, 2011, p. 123; University of Miami, 2025, n.p.; J.-H. Zhao & Yang, 2023, p. 1004). Moreover, they appear useful for formative feedback on students’ assignments, fostering social interaction (A. B. P. Sari, 2019, p. 46) and an ongoing learning dialogue (McLachlan & Tippett, 2024, pp. 249–250). Some students cited by D. M. T. Nguyen and Trang (2023) even considered digital boards as “a simple version of a social network where they could demonstrate their […] abilit[ies]” (p. 3406).

Digital board feedback has mostly been studied in English language learning and teaching contexts (Ahmad et al., 2022; Al Naqbi, 2011; Awaludin et al., 2017; England, 2017; Ferro, 2018; Holovina, 2021; Indrasari, 2019; Kimura, 2018; etc.), but it has also been implemented in other disciplines, such as business communication (Leslie & Johnson, 2022; Lyn, 2022), dental education (Rath, 2025) and biology (Subramaniam & Fadzil, 2021). Subsequent to the current study, we even found one implementation example in which the teacher and students utilized the digital board Miro for research projects (Lamere, cited in University of Miami, 2025, n.p.). Although many studies used digital boards to provide feedback for written assignments (e.g. Al Naqbi, 2011; Aisyah et al., 2024; Sugiarni & Firdaus, 2024, p. 1146), the possibility to upload multimedia files also makes them useful for other task types, which, however, requires further investigation (see e.g. J. Chen & Bogachenko, 2023).

Those multimedia boards enable participants to post notes, documents and audiovisual media, share ideas, and engage in assignments or activities anytime and from anywhere (Albarqi, 2023, p. 185; D. M. T. Nguyen & Trang, 2023, pp. 3405, 3407), thus facilitating distance communication and peer feedback (Ahmad et al., 2022, p. 488; Albarqi, 2023, p. 185; Bodnenko et al., 2020; Lyn, 2022, p. 2; Aisyah et al., 2024, p. 92; D. M. T. Nguyen & Trang, 2023, p. 3400; A. B. P. Sari, 2019, p. 46; Sugiarni & Firdaus, 2024, p. 1146). Hence, users may contribute text, audio or video comments and might even arrange the contents flexibly (Schluer, 2022a, pp. 98, 234). This way, they give feedback seekers and producers various options for expressing their ideas and opinions (A. Ali, 2021, p. 3; Awaludin et al., 2017; Bodnenko et al., 2020; T. T. B. Lien et al., 2023). Moreover, since digital boards allow for asynchronous contributions, they grant students time for reflection and critical engagement before posting their comments (cf. A. Ali,

2021, p. 3; Bodnenko et al., 2020; Holovina, 2021; D. M. T. Nguyen & Trang, 2023, p. 3407) and after receiving others' remarks (Rath, 2025, pp. 2, 5–6). Likewise, further feedback participants can view the comments instantaneously, as digital boards rely on cloud-based technologies (University of Miami, 2025, n.p.; Sugiarni & Firdaus, 2024, pp. 1147, 1156).

Through these features, virtual boards can facilitate the visual organization of learning contents as well as promote student participation and interaction during collaborative learning (Ahmad et al., 2022; England, 2017; Indrasari, 2019). Indeed, prior studies observed an increase in student engagement and motivation (A. B. P. Sari, 2019, p. 55), as became discernible through students' active participation and contributions (Albarqi, 2023, pp. 189–192; A. Ali, 2021; Ferro, 2018; Holovina, 2021; Jong & Tan, 2021, p. 418; Kimura, 2018, p. 125; Leslie & Johnson, 2022, p. 38; D. M. T. Nguyen & Trang, 2023, p. 3407; Sugiarni & Firdaus, 2024, pp. 1154, 1157). This, in turn, can lead to better rapport with and among the students (J. Chen & Bogachenko, 2023, p. 9948), enhanced interpersonal skills and collaboration (Albarqi, 2023, pp. 189, 192; Rath, 2025, p. 3) as well as improved learning (McLachlan & Tippett, 2024, p. 253; D. M. T. Nguyen & Trang, 2023, p. 3407; Sugiarni & Firdaus, 2024, p. 1146) and feedback literacy (Rath, 2025, p. 3). The very fact that students can see other's comments and contributions could help increase students' multi-perspectivity and critical thinking (Rath, 2025 pp. 1, 5). By engaging with "diverse perspectives" (Rath, 2025, p. 5), students might reflect on and reconsider their own understanding and seek further dialogue.

Students generally considered digital boards as user-friendly (Jong & Tan, 2021, p. 416; Kimura, 2018, p. 123; Lyn, 2022, p. 2; D. M. T. Nguyen & Trang, 2023, p. 3405; Sugiarni & Firdaus, 2024, pp. 1146, 1154, 1158) and appreciated the various sharing options that give everyone "an equal chance to participate" (A. B. P. Sari, 2019, p. 53; cf. Bodnenko et al., 2020, p. 360; Miles, 2021, cited in Yesmin & Siddique, 2023, p. 5). Consequently, digital boards seem particularly suitable for peer projects and brainstorming tasks (cf. Schluer, 2022a, p. 102). Additionally, teacher feedback might be provided after the peer exchange (see Schluer, 2022a, p. 42). Furthermore, they can monitor students' (involvement in the) peer feedback process (Albarqi, 2023, p. 185) and provide guidance as needed. Indeed, while students may enjoy commenting on virtual boards, they might feel challenged in providing constructive and helpful remarks instead of overly negative or 'preachy' comments (Awaludin et al., 2017). Consequently, teachers could browse the posts and encourage deeper engagement as well as critical reflection on specific comments to heighten the peer feedback quality (cf. cloud editors in section 2.6.2). Digital boards also help teachers to evaluate individual contributions in collaborative learning by assessing each student's involvement in group projects (Bodnenko et al., 2020, p. 361).

However, depending on the chosen application and the tool settings, the commenting can occur in anonymous or non-anonymous ways. In several studies, students considered anonymous commenting more convenient, as it helped to create "a safe environment" (Rath, 2025, p. 5) in which feedback providers can express their thoughts without fear (Rath, 2025, pp. 1, 5;

A. B. P. Sari, 2019, pp. 46–47; Sugiarni & Firdaus, 2024, pp. 1157–1158). The confidential and "trusting environment" (Rath, 2025, p. 1) additionally increased their confidence and self-esteem (A. B. P. Sari, 2019, p. 55; Sugiarni & Firdaus, 2024, p. 1158). Likewise, feedback recipients considered anonymous feedback as advantageous (Rath, 2025, p. 5; A. B. P. Sari, 2019, p. 51). Yet, anonymity also "reduce[s] accountability" (Rath, 2025, p. 5) and might exacerbate follow-up discussions, which is why decisions about the commenting mode need to be made with caution. For instance, stronger personal connections and "positive learner attitudes" can be enhanced in open reviews (see review by J. Chen & Bogachenko, 2023, p. 9937), especially when audio or video modes are used (students cited in J. Chen & Bogachenko, 2023, pp. 9946–9948). On the other hand, some students might be "too shy to audio/videorecord themselves in postings, or fac[e] technological difficulties" (J. Chen & Bogachenko, 2023, p. 9949; see also section 2.6.4).

Especially when used in text-only mode, digital boards have been described as a time-efficient technology (D. M. T. Nguyen & Trang, 2023, p. 3405; A. B. P. Sari, 2019, p. 53), also because they allow for the collection of a large amount of feedback in a short time frame (Indrasari, 2019, p. 98). Theoretically, there is no limit as to how many persons can participate, but depending on the available options to organize the contents, the board might quickly become crowded and overwhelming. Especially in larger courses, the utilization of digital boards may cause problems since the management and organization of contents become more difficult (A. Ali, 2021, p. 4).

As with digital technologies in general, instructors also need to consider students' access to devices and internet connectivity, as limitations in these areas can impact the effectiveness of using Padlet (England, 2017, p. 59). The same applies to the available features, which may vary from tool to tool (see e.g. the comparison of Padlet and Trello by Rudenko et al., 2024, and additionally of Jamboard and Miro by University of Miami, 2025). Padlet, for example, is a popular digital board application that allows users to create and collaborate on interactive content through various media files, including text comments, hyperlinks, pictures, and videos (Rudenko et al., 2024, pp. 332–333; Schluer, 2022a, pp. 102–103; Sugiarni & Firdaus, 2024, p. 1147). Furthermore, it is not only possible to upload voice or video messages but also to produce them spontaneously with Padlet's in-built audio and screencast recorder (Schluer, 2022a, p. 234). However, Padlet is restricted to three boards in the free version, and export functions are limited (Rudenko et al., 2024, p. 332). The posted content can be accessible to anyone with the relevant link or address (Indrasari, 2019, pp. 97–98; Jong & Tan, 2021, p. 414), but Padlet creators could also adjust the privacy and editing settings, for instance to restrict the access to class members only (Schluer, 2022a, p. 103). The instructor and peers can subsequently reply to, comment on, rank, like, or color the students' posts as well as the entries by other peer-reviewers and the teacher (Gießler & Olejniczak, 2024, p. 138; Schluer, 2022a, p. 98, 103; cf. Albarqi, 2023, quoted in Chong & Reinders, 2023, p. 8). Some digital board tools even enable polling, thus allowing

feedback seekers to obtain a fast response to their open questions (e.g. Padlet or Miro, quoted in University of Miami, 2025, n.p.). Other software, such as Miro, additionally offers numerous highlighters, markers and shapes for direct annotations (University of Miami, 2025, n.p.). Concerning Padlet, students lauded its visual appeal, with a variety of templates, decorative backgrounds and formatting options (D. M. T. Nguyen & Trang, 2023, p. 3406; Rudenko et al., 2024, p. 332; Sugiarni & Firdaus, 2024, p. 1156).

This broad scope of functions seems to make Padlet a convenient tool for multimodal and multidirectional feedback exchanges (Gießler & Olejniczak, 2024, p. 137). Despite its many options, even novices consider it easy to use (A. B. P. Sari, 2019, pp. 46–50) due to its "intuitive interface" (Rath, 2025, p. 3; cf. Sugiarni & Firdaus, 2024, p. 1158). Students highlighted that it contributed to a "comfortable learning atmosphere", which brought "more fun" (D. M. T. Nguyen & Trang, 2023, p. 3407; cf. Sugiarni & Firdaus, 2024, pp. 1154, 1157) and enjoyment. However, some may view external and commercial service providers (such as Google, Miro or Padlet) as questionable in terms of data protection, as they contradict the policies of their educational institution (cf. England, 2017, p. 59; Schluer, 2022a, p. 97). Several schools and institutions therefore recommend alternative tools with similar functions. For digital boards, it is suggested that TaskCards is a more privacy-compliant application than Padlet. Moreover, further tools and functions might be released in the future. Therefore, instead of focusing on specific applications only, it is more important to consider how these features can be utilized best to support the feedback and learning process. In this study, Padlet will thus serve as an exemplary tool that could be substituted by another tool offering similar features.

Likewise, many programs and apps are available to record audio and video files. The characteristics of digitally recorded feedback will be expounded in the next section.

2.6.4. Digitally Recorded Feedback

Digitally recorded feedback comprises different audio(-visual) asynchronous options for commenting, including audio- and screencasts, talking-head videos and combinations thereof (cf. Dawson et al., 2023, pp. 703–704; Phillips et al., 2017, p. 364; Ryan et al., 2016, p. 2). Mostly, these feedback formats were employed for teacher-to-student feedback (Dawson et al., 2023, p. 703) but only very rarely for peer feedback purposes. Also, the review task was commonly a written submission (Dawson et al., 2023, p. 704). The particularities of the different formats will be explained next before their advantages and limitations will be outlined based on a review of relevant studies.

2.6.4.1. Audio Feedback

In **recorded audio feedback**, assessors record their voice (verbal feedback) using an (internal or external) microphone and then share the electronic sound file with the learners (Bond, 2009; Escultura & Mejico, 2023, p. 55; Listiani et al., 2024, p. 2; Renzella & Cain, 2020). It thus

constitutes a lasting record of spoken feedback which transcends the ephemeral nature of oral conversations. This method is appropriate for longer, reflective assessments of student work that do not require visual support (Bond, 2009; Escultura & Mejico, 2023, p. 55; Renzella & Cain, 2020). Since the feedback is separated from the work being assessed, "cognitive overload may occur due to the split-attention effect" (Silva, 2012, p. 4, based on Mayer, 2009). This makes it challenging for the learners to spot the relevant passages in the reviewed document, as no direct referencing is possible (unlike, for instance, written comments in the margin) (Bond, 2009; Howard, 2018, pp. 16–17, 197; W. Kerr & McLaughlin, 2008; Mayhew, 2017, cited by Escultura & Mejico, 2023, p. 55; Roy & Vetter, 2023, pp. 159–160; Zhan, 2023, pp. 98, 100). Since there is no visual support that might disambiguate meanings (cf. McCarthy, 2015, 164), audio feedback rather seemed to be preferred by students with higher listening proficiency in the target language (Roy & Vetter, 2023, pp. 163, 165). However, vocal emphasis can clarify the meaning of certain comments, and the pace of speech can be adjusted to draw learner's attention to specific aspects or concepts (Bond, 2009, p. 2). Moreover, some word processing programs enable the insertion of audio clips to particular text passages (see e.g. Bakla, 2020; Stapleford, 2023, p. 7; Warnock, 2008, p. 201; cf. the review by Schluer, 2022a, p. 169). This way, oral comments could also be combined with corrections on grammar, spelling, and punctuation errors, which are usually neglected in audio feedback (Cavanaugh & Song, 2014; Ice et al., 2010). To summarize, while audio feedback has typically been provided as a separate file, some programs also allow for the integration of voice comments in specific documents, slides or platforms (Listiani et al., 2024, p. 2; see e.g. Zhan, 2023, p. 94).

2.6.4.2. Talking-Head Video Feedback and Combination Screencast Feedback

In **recorded video feedback**, teachers (or peers) use a webcam or other camera (e.g. smartphone camera) to record themselves while providing verbal feedback (Schluer, 2022a, p. 175). Usually, only the head and shoulders of the assessor are shown, thus the name "talking-head video feedback" (Mahoney et al., 2019, p. 158). It conveys the impression of live communication and may build a sense of connection or relationship between the feedback provider and recipient (Borup et al., 2012, p. 201; 2014, p. 236; Ryan, 2021, p. 138). Also, due to the perception of social cues, such as body language, facial expressions or gestures (Borup et al., 2015, p. 177), as well as conversational cues, e.g. the tone and pace of voice (Ryan, 2021, p. 138), the likelihood of misinterpretations is reduced (Hall et al., 2016; A. R. Lee & Bailey, 2016, p. 133). However, the assessor's potential disappointment or frustration over student's poor performance might be discernible in the video when body language and facial expressions are recorded (Borup, 2021; Borup et al., 2015, p. 177). Students therefore sometimes reported being anxious or nervous "about seeing the assessor's face while receiving feedback" (Henderson & Phillips, 2015, p. 58; cf. Hall et al., 2016). Consequently, feedback providers need to ensure that their body language, facial expressions, and tone of voice are positive enough so that

they do not inadvertently convey information that could be interpreted as negative or discouraging by the feedback recipients (Ryan, 2021, pp. 138–139). Furthermore, the feedback producer should be in a quiet room with minimal external auditory and visual distractions to enhance the quality of the recording (Borup et al., 2014, p. 236; 2015, p. 175; Lamey, 2015, p. 695).

Generally, talking-head video feedback appears particularly suitable when learners' work does not need to be displayed (Borup, 2021). Otherwise, it would be very difficult for the recipients to connect specific aspects of the feedback to their own work (similar to audio feedback) or to refer to particular passages when asking questions about it (Hall et al., 2016; Henderson & Phillips, 2015). To circumvent this, the camera recording can alternatively be combined with a screen-recording, thus producing a so-called **combination screencast video** (Mahoney et al., 2019, pp. 158–159). In Zahro's (2023) study, the wide majority of students preferred seeing the teacher in screencast feedback (p. 43), but it is uncertain whether the same would apply to peer feedback, especially on the provider's side.

2.6.4.3. Screencast Feedback

Screencast feedback, i.e. a digital screen-recording together with voice-over narration, is recommended whenever the reviewed assignment needs to be shown along the oral commentary (see Schluer, 2022a, pp. 185–190; e.g. Cunningham, 2019b, p. 224; Rayeji & Tabandeh, 2023, p. 72; Savaşçı & Akçor, 2022, pp. 109–110). It can be used in a wide variety of settings for any type of work as long as it "can be displayed on a screen" (Schluer, 2022a, p. 187). This also includes photographs or videos of handcrafted work. Most frequently, screencast feedback has been utilized for longer written works, such as term papers, essays, or presentations, especially in foreign language teaching (see review Schluer, 2022a, p. 187; e.g. A. D. Ali, 2016; Cunningham, 2017).

During the recording, both verbal (emphasis, intonation, etc.) and visual (mouse gestures, color usage, underlining, text corrections via keyboard, etc.) strategies can be used to direct learners' attention, for example to point out positive passages as well as passages that need improvement (Schluer, 2021b; 2022a, pp. 189–190). Since the feedback provider can pinpoint concrete aspects of the assignment being reviewed, the clarity and transparency of the comments is enhanced (e.g. A. D. Ali, 2016, p. 117; R. N. Sari & Cahyono, 2024, pp. 1215–1216; Schluer, 2020a, p. 3; see the review by Schluer, 2022a, pp. 188–189). Thus, beyond an adequate modulation of the voice (cf. Jones et al., 2012, p. 603; Merry & Orsmond, 2008, p. 9), screen actions can be of various types, including cursor movements such as pointing, circling or marking passages or elements with the cursor, or scrolling through the reviewed document; color-coding of text elements representing different assessment criteria; using zoom or spotlight effects as well as inserting boxes, arrows or other forms during or after the screen-recording for visual emphasis; hyperlinking additional websites or worksheets; and many more (see e.g. Schluer, 2021b, pp. 168–169; 2022a, pp. 201–202). Moreover, further helpful resources

(handouts, slides, web pages, etc.) can be shown directly during the screen recording to provide additional guidance (Schluer, 2021b; 2022a, p. 199). To ensure a smooth synchronization of the oral and visual information (Stannard & Sallı, 2019, p. 461), sufficient preparation, practice and post-editing might be necessary (see Schluer, 2022a, pp. 195–203). Prior to or during the recording, assessors may also annotate the student's assignment with mark-ups or written comments, using the track changes or comment functions of a text-editing program (Schluer, 2022a, pp. 198–199). These files can then be shared with the student alongside the video to ease the revision process (pp. 194, 206–207).

In comparative studies, screencast feedback was typically regarded as more effective than other methods, such as face-to-face feedback (e.g. to improve EFL learners' speaking proficiency; see Rayeji & Tabandeh, 2023, p. 80), other recorded feedback methods (notably audio feedback), and written feedback (see e.g. study by Ebadi & Dadgar, 2024, p. 160; cf. Kurt & Karabulut, 2024, preprint p. 19). However, several benefits and challenges are also shared across different digitally recorded feedback formats, as will be reviewed next.

2.6.4.4. General Affordances of Recorded Feedback

In contrast to synchronous online or on-site conferences, a major affordance of **recorded feedback** is that it can be replayed by the learners, thus catering to students' individual pace and potentially promoting deeper processing (for audio feedback: Bond, 2009, p. 2; Ice et al., 2007, p. 3; for screencast feedback: Carvalho, 2020; Crook et al., 2012, p. 387; J. Kerr et al., 2016, p. 17; Kurt & Karabulut, 2024, preprint p. 20; R. N. Sari & Cahyono, 2024, p. 1216; for video feedback: Tseng & Yeh, 2019, p. 146). Moreover, as compared to written feedback, the oral modality facilitates additional explanations and emphases, which can result in better understanding of the feedback message (for audio: cf. review by Haw et al., 2023, p. 4, and Kiymaz, 2022, p. 93; e.g. Hennessy & Forrester, 2014, p. 781; McCarthy, 2015, pp. 162, 164; Merry & Orsmond, 2008, p. 8; Zhan, 2023, p. 92; for video: Lamey, 2015, p. 694; for screencast: Ebadi & Dadgar, 2024, p. 161; Hall et al., 2016; Özkul & Ortaçtepe, 2017; Thompson & Lee, 2012). Students therefore frequently lauded the greater clarity of the feedback message (audio: e.g. Haw et al., 2023, p. 10; Kirwan et al., 2023, p. 28; screencast: Pachuashvili, 2023, p. 102; 2024, p. 237; Zahro et al., 2023, p. 713), helping them understand the line of thoughts and suggestions of the feedback provider (audio: Escultura & Mejico, 2023, p. 59). This greater elaboration and comprehensibility can, in turn, motivate the students to implement the comments (audio: Escultura & Mejico, 2023, p. 59; Saputra et al., 2023, p. 748; screencasts: e.g. Fatoni et al., 2024, p. 524).

Even though oral feedback is naturally more detailed than in written modes (audio: e.g. Kirwan et al., 2023, p. 26), recorded feedback might eventually be less time-consuming than handwritten or typed feedback (for audio: Lunt & Curran, 2010; for video: Borup et al., 2015). Recordings could even alleviate physical problems such as Repetitive Strain Injury (RSI)

syndrome (overuse syndrome of hand, arm and shoulder due to excessive writing and typing) (Bond, 2009, comparing audio feedback and handwritten feedback).

However, findings on the time efficiency are mixed (see e.g. the review by Haw et al., 2023, pp. 5, 11; screencasts: e.g. Pachuashvili, 2023, p. 103; 2024, p. 237; Zahro et al., 2023, p. 713), probably resulting from the (shift in) assessment strategies (see Stapleford, 2023). Notably, when assessors prepare written notes as a foundation for their recording (screencast: see e.g. Savaşçı & Akçor, 2022, p. 119; Schluer, 2022a, p. 198) and thus use "voice comments in addition to rather than instead of the usual written comments" (Stapleford, 2023, p. 9, about audio), higher time demands arise. In that regard, the spoken comments may fulfil different purposes, such as expanding on or summarizing the written remarks or simply repeating them in the oral modality (Stapleford, 2023, p. 10). In Stapleford's (2023) study, a tutor even noted a backwash effect, since s/he even created more personalized written comments in anticipation of the subsequent voice recording (p. 10). Supporting the audio(visual) comments with additional coding, such as through written annotations or coloring, can certainly cause greater time expenses, but might be beneficial for the recipients (cf. Savaşçı & Akçor, 2022, p. 119).

Finally, the oral (and additional video) channel is considered conducive to relationship-building and affective support for the learners (audio: Roy & Vetter, 2023, p. 159; Zhan, 2023, pp. 92, 96; screencast: A. D. Ali, 2016; Anson et al., 2016; Borup et al., 2015; Ebadi & Dadgar, 2024, p. 161; Grigoryan, 2017). Although the feedback providers are not physically present, they felt like "getting the feedback face to face" (student cited in Haw et al., 2023, p. 10; italics omitted; audio feedback; for screencast feedback, cf. e.g. Kurt & Karabulut, 2024, p. 17; Rayeji & Tabandeh, 2023, p. 80). This recorded feedback can even be "less intimidating [for them] than in-person conversations" (Haw et al., 2023, p. 4, with reference to Hennessy & Forrester, 2014).

Similarly, feedback givers gained "the impression of a conversation with students" (Stapleford, 2023, p. 12; cf. Pachuashvili, 2024, p. 229; for combination screencasts: Zahro, 2023, p. 43) and noticed that they used more "natural", "authentic language" in their voice comments (Stapleford, 2023, p. 12). Some even gestured as in a live conversation, even though they only recorded their audio (Stapleford, 2023, p. 14). This created a sense of "proximity" (audio: Stapleford, 2023, p. 4) or "connectivity" (audio: Kirwan et al., 2023, pp. 25, 27, 29) and "dialogue" (Kirwan et al., 2023, p. 28), with the tone of the voice playing a crucial role in motivating the students to engage with and implement the feedback (audio: Haw et al., 2023, p. 3; Kirwan et al., 2023, pp. 25, 29; Roy & Vetter, 2023, p. 159; Zhan, 2023, p. 96; screencast: Ebadi & Dadgar, 2024, p. 161; Fatoni et al., 2024, p. 524; , Kurt & Karabulut, 2024, preprint p. 20). Hearing the voice also made students feel valued, with teachers "really car[ing] about them and their work" (Hennessy & Forrester, 2014, p. 782; cf. Escultura & Mejico, 2023, p. 59; cf. review by Stapleford, 2023, p. 4; for screencasts, see e.g. Fatoni et al., 2024, p. 524; Pachuashvili, 2024, p. 237), as they must have "thoroughly read their assignments" (audio: Saputra et al., 2023, p. 751) and put "time and effort" into producing a personalized recording for them (audio: Haw et al., 2023,

p. 10). Personalization can be further enhanced by addressing the recipients by name (Winstone et al., 2017, cited by Kurt & Karabulut, 2024, preprint p. 20), which may further boost learners' confidence (audio: Kirwan et al., 2023, p. 29), motivation (screencasts: Fatoni et al., 2024, p. 523) and self-regulated learning efforts (p. 524). Also, higher rates of improvement were detected in several studies when compared to e.g. written feedback (audio: see studies by Alharbi, 2021, and Saeed et al., 2022, both cited by Listiani et al., 2024, p. 11; screencasts: Kurt & Karabulut, 2024, preprint p. 19; Thennakoon, 2023, p. 9). Nevertheless, there are certain limitations to consider that will be summarized below.

2.6.4.5. General Limitations of Recorded Feedback

Each of the recorded feedback types also comes along with certain limitations or challenges. First, technical issues may prevent learners from receiving feedback, for instance due to incompatible file formats, outdated devices or old media players or insufficient storage space (e.g. Bahula & Kay, 2020, p. 6538; A. R. Lee & Bailey, 2016, p. 146). Moreover, unstable or slow internet connections might result in long loading times for videos (A. D. Ali, 2016; Bakla, 2017, p. 329; Cruz Soto, 2016, pp. 49–50; A. R. Lee & Bailey, 2016, p. 146; Özkul & Ortaçtepe, 2017, p. 872).

An additional disadvantage is that learners cannot skim the feedback and search for keywords as easily as they could do for written feedback; instead, they need to listen the whole file again to detect relevant points for revision (for audio feedback, see Cann, 2014; Parkes & Fletcher, 2014, cited in Escultura & Mejico, 2023, p. 55; Zhan, 2023, pp. 98, 100; for screencasts: e.g. R. N. Sari & Cahyono, 2024, p. 1215; Zahro et al., 2023, p. 714). However, with advancements in automated speech recognition and video transcription, these barriers can be overcome to a certain extent (Schluer, 2022a, pp. 182, 196), which may also help to reduce difficulties in understanding the speaker's accent (cf. student cited in Ebadi & Dadgar, 2024, p. 159). Moreover, artificial intelligence might be used to identify "key moments" (Bridgeman & Giraldez-Hayes, 2024, p. 35) to direct students to important parts; yet, this feature is still error-prone since the personal importance attached to particular sequences on the feedback provider's side could differ from auto-generated classifications.

For producers, the creation of recorded feedback can also be time-consuming, especially for beginners (for screencast feedback, see e.g. J. Kerr et al., 2016, p. 18; Schluer, 2021a, p. 165; Séror, 2012, p. 108; van der Zijden et al., 2021, p. 59). They would need to install and familiarize themselves with the recording software and maybe purchase or borrow additional technical equipment to ensure a good quality of the recording (e.g. external microphone; cf. e.g. Cunningham, 2017, p. 14; W. Kerr & McLaughlin, 2008, p. 3). Furthermore, to avoid unstructured feedback, reviewers are commonly advised to take notes before starting the recording and create a rough outline of the key points (for audio feedback, cf. Bond, 2009; Stapleford, 2023; Zhan, 2023, p. 101; for video feedback, cf. Özkul & Ortaçtepe, 2017, pp. 865–866; for

screencast feedback, see Stannard, 2007; 2018, p. 18, and the suggestions by Schluer, 2022a, p. 198). Additionally, they need to find a quiet place to do the recording (for audio: Hennessy & Forrester, 2014, pp. 781, 786–787; Zhan, 2023, p. 101; for video: Borup et al., 2015, p. 175; Lamey, 2015, p. 695; for screencast: van der Zijden et al., 2021, p. 60; Vincelette & Bostic, 2013, p. 269). Finally, to distribute the videos, a suitable platform is needed that provides sufficient storage space as well as secure access by the recipients (cf. Schluer, 2022a, p. 203).

Furthermore, on the social and emotional dimension, both providers and recipients could experience nervousness, anxiety and insecurities (Pachuashvili, 2024, p. 230). Feedback givers are advised to "moderate their mood and tone to minimize unpleasant emotional experiences" (R. N. Sari & Cahyono, 2024, p. 1210), but at the same time they might feel insecure or overwhelmed due to the unfamiliar feedback format. In the end, though, this can be alleviated by sufficient practice, both on the providers' and recipients' part (cf. Pachuashvili, 2024, p. 230).

Generally, decisions about the appropriate mode (or combination of modes) should be based on pedagogical considerations and research evidence, not on novelty or familiarity. According to multimedia learning theory (Mayer, 2006; Mayer & Fiorella, 2022), several principles need to be considered in the design of multimedia contents. For example, when learners have to pay attention to an audio file and a separate written document simultaneously, audio feedback can result in split attention, which increases cognitive load and complicates information processing (Silva, 2012, p. 4, with reference to Mayer, 2009; cf. Sweller, 1988; see section 2.6.4.1). Similarly, if the assessor's video image is shown alongside a screen-recording, learners might not know where to focus their attention (Sweller, 1999, cited by Mayer & Moreno, 2003, pp. 45–46; Mayer, 2006, pp. 139–140). Hence, having the voice as the only supplement to the screen-recording might be conducive or sufficient in many cases. On the other hand, the speaker's video may enhance the degree of personalization (Mayer, 2002, p. 29) and could therefore be incorporated at the beginning or end of a feedback video (Schluer, 2022a, p. 200).

This notwithstanding, a frequently cited disadvantage of recorded feedback (or asynchronous feedback more generally) is its reduced interactivity (for audio, see e.g. Zhan, 2023, pp. 98, 100; for screencasts, e.g. R. N. Sari & Cahyono, 2024, p. 1215). Even though video and screencast files often give the impression of a conversational exchange, they are actually only instances of a one-way interaction (Mahoney et al., 2019, p. 166; Stannard, 2019, pp. 67–68; Thompson & Lee, 2012). Thus, it is not directly possible for learners to ask questions and engage in follow-up feedback dialogues (Bakla, 2017, p. 328; Hall et al., 2016; Lamey, 2015; O'Malley, 2011, p. 30; Özkul & Ortaçtepe, 2017, p. 873; Zhan, 2023, p. 98). To facilitate such interactive exchanges, an adequate pedagogical design (e.g. with subsequent live meetings) and the utilization of suitable tools or learning platforms is essential. For instance, video platforms such as YouTube, VoiceThread or Loom enable follow-up commenting (Schluer, 2022a, p. 193). Furthermore, combinations with other feedback methods seem beneficial. For example, recorded (screencast) feedback can be combined with the utilization of cloud-editing applications,

as Wood (2019) has shown regarding Google Docs. In that respect, linguistic feedback might additionally be accelerated through automated writing evaluation (AWE) in the word processor or via an add-in (e.g. Grammarly, see Ebrahimi & Ebadi, 2024, p. 15). Another option is utilizing online forums for further feedback exchanges (see next section).

2.6.5. Online Forum Feedback

Forum feedback is an asynchronous digital collaborative feedback method in which teachers or peers use the features of an online discussion forum (ODF) to seek and exchange feedback, notably through comments and likes (see reviews by Schluer, 2022a, pp. 104–105, and Steenkamp & Brink, 2024, p. 2; cf. Essa et al., 2023, p. 511). It has been commonly used for written assignments in various subjects (Schluer, 2022a, p. 105), such as EFL (Ekahitanond, 2013; Tawalbeh & Al-Husban, 2023, p. 511), psychology (Hara et al., 2000; Rochera et al., 2021), computer science (He et al., 2023), biology (Pedrosa-de-Jesus & Moreira, 2012), or education (Vonderwell, 2003). However, file uploads and thus the sharing of different media are likewise permitted in many forum applications, which make them versatile tools for commenting on several different media types (Essa et al., 2023, p. 511). Often, forums are integrated into a learning management system (LMS), such as Moodle, Canvas or Blackboard (cf. Todorova, 2024, p. 4).

In the literature, terminology is, however, inconsistent, with ODFs (“online discussion forums”; Mudau & van den Berg, 2023, p. 3) alternatively being called ADFs (“Asynchronous Discussion Forums”; Essa et al., 2023; Tawalbeh & Al-Husban, 2023: ADFs) or more generally “discussion forum[s]” (Dawson et al., 2023, p. 718). They have also been described as “electronic bulletin board[s]” (Steenkamp & Brink, 2024, p. 2), “message boards” (Essa et al., 2023, p. 511, with reference to Kaur, 2011), or else “discussion boards” (Dawson et al., 2023, pp. 716–717; cf. Torres & Satti, 2024, pp. 42–43). Depending on the available tool features, this not only hints at permeable boundaries with digital board applications (see section 2.6.3), but also with the different purposes online forums might serve. For instance, several studies on “(asynchronous) discussion boards” or “discussion forums” rather dealt with thematic discussions that were initiated and guided by the teacher rather than with feedback on students’ assignments. Even more so, the exact meaning of the term “asynchronous online discussions” (Xie & Correia, 2024, p. 71) remains unclear, particularly since the construct was not defined by the authors, while the word “forum” was used only once. At the same time, this ambiguity instantiates the fluid boundaries between “discussions” and “feedback”, requiring a close reading of the pertinent literature (see dialogic conceptualization in section 2.1).

Typically, the exchanges in the forums take place asynchronously, which allows students “to think deeply, research, reflect and edit their work before posting it online” as well as “to revisit and continue conversations over time” (Essa et al., 2023, p. 522) in a flexible manner (Tawalbeh & Al-Husban, 2023, pp. 513–514). Notably, the asynchronous use of ODF offers learners more time to reflect on the feedback they give (Vonderwell, 2003, p. 86) and receive

(Ekahitanond, 2013, p. 260; cf. Dawson et al., 2023, pp. 716–717). This way, students' skills of critical inquiry and critical thinking could be fostered (Pedrosa-de-Jesus & Moreira, 2012, p. 58; cf. Torres & Satti, 2024, p. 47). In forum peer feedback, the advantages can thus be manifold, as students "draw on one another as resources" (Essa et al., 2023, p. 518), "share their diverse perspectives" (p. 508)", enter into dialogue with "and learn from their peers" (p. 517).

In fact, the affordance of appreciating and engaging with a diversity of perspectives has been outlined in several recent studies dealing with online forums (Essa et al., 2023, p. 517; Mansour, 2024, p. 15977; Mudau & van den Berg, 2023, pp. 3, 8–9, 11; Schaefer et al., 2019, p. 1365; Steenkamp & Brink, 2024, pp. 6–7; Torres & Satti, 2024, p. 41). This engagement can occur in different ways, either by "observing […] peers' interactions on the discussion forum" (see review by Steenkamp & Brink, 2024, p. 3), by reading and "thoroughly contemplat[ing] their classmates' input before sharing their own ideas" (Mansour, 2024, p. 15969, with reference to Ho & Swan, 2007; see also Essa et al., 2023, p. 518; Steenkamp & Brink, 2024, p. 6) or by "respond[ing] to each other's posts" (Mudau & van den Berg, 2023, p. 8). Viewing fellow students' posts and ideas was usually considered valuable (J. Chen & Bogachenko, 2023, p. 9942; Steenkamp & Brink, 2024, p. 6) and prompted them to consider and critically evaluate alternative interpretations (Mudau & van den Berg, 2023, p. 3; cf. Steenkamp & Brink, 2024, pp. 3, 6–7). This might potentially lead to a more nuanced and holistic understanding (Mansour, 2024, p. 15977) or a change in their own thinking (Mudau & van den Berg, 2023, p. 8). For example, in the study by Ekahitanond (2013), students' understanding of "content, and how to organize and synthesize that content for their final submitted papers, were facilitated and elevated through the process of exchanging ideas, learning together, and comparing peers' responses" in an ODF (p. 260). Some others, in turn, consciously decided not to read other's posts before contributing their own opinion (Steenkamp & Brink, 2024, p. 7). Forums thus offer "users the freedom to […] selectively read and re-read certain posts" and "explore [them] in any order" (Steenkamp & Brink, 2024, p. 2).

At the same time, the often delayed and primarily text-based nature of the feedback is its major limitation (see review by Schluer, 2022a, p. 106; cf. e.g. J. Chen & Bogachenko, 2023, p. 9937). So, questions might be left unanswered (Vonderwell, 2003, p. 83) and follow-up interactions could be impeded (J. Chen & Bogachenko, 2023, p. 9944; Essa et al., 2023, p. 523). Due to the lack of direct interpersonal interaction, paralinguistic cues (J. Chen & Bogachenko, 2023, p. 9946) and visual support, messages might be misunderstood easily (Hara et al., 2000, p. 116; Vonderwell, 2003, p. 79). Crafting clear written feedback, in turn, can be time-consuming (Ekahitanond, 2013, p. 258), which may discourage some learners from actively contributing to the ODF (J. Chen & Bogachenko, 2023, p. 9937). Furthermore, some students could feel "uncomfortable about interacting" (Vonderwell, 2003, p. 82) with (relatively unknown or anonymous) peers in ODF. Conversely, scholars have argued that the use of forums might also encourage shy students to ask more questions or start a discussion, as compared to face-to-face

interactions in the classroom (Ekahitanond, 2013, p. 258, and Pedrosa-de-Jesus & Moreira, 2012, p. 69; Vonderwell, 2003, p. 82). Forums could enable students "an equal opportunity to contribute" (Mansour, 2024, p. 15969), while the asynchronous nature grants students with lower language proficiency more time to craft posts and thus feel more secure and comfortable (Steenkamp & Brink, 2024, p. 3). However, in the asynchronous learning space, students might also forget about checking out new posts or revisiting former ones (Essa et al., 2023, p. 523; cf. Torres & Satti, 2024, p. 45), especially if the forum does not include a notification function (J. Chen & Bogachenko, 2023, p. 9944). Furthermore, if students notice that hardly anyone is responding, they might refrain from doing so as well (J. Chen & Bogachenko, 2023, p. 9946; Torres & Satti, 2024, p. 44).

This "snowball effect" (J. Chen & Bogachenko, 2023, p. 9946) could occur in a positive manner, though, with forums fostering an interactive social space (Pedrosa-de-Jesus & Moreira, 2012, p. 57) where students engage with other points of view (Ekahitanond, 2013, p. 260). Hence, forums allow students not only to "introspect [but also to] interact with their peers" (Tawalbeh & Al-Husban, 2023, p. 510, based on Hasani et al., 2021). Thus, similar to digital boards, forum feedback might establish or reinforce a sense of a learning community, promoting communication and exchange between students and teachers (cf. reviews by Mudau & van den Berg, 2023, p. 1, and Schluer, 2022a, p. 106). This can "cultivate connectivity" (Tawalbeh & Al-Husban, 2023, p. 509) beyond the traditional classroom.

Whereas virtual boards with their flexible arrangements can easily become cluttered and disorganized, forum feedback offers a systematic structure (Mansour, 2024, p. 15981) and facilitates the monitoring of participants' contributions, i.e. concerning the comments they post as well as their responses to the feedback (Ludwig-Hardman & Dunclap, 2003, cited in Rochera et al., 2021, p. 4). Indeed, these threaded conversations are a commonality and characteristic feature of online forums (Mansour, 2024, p. 15967; Mudau & van den Berg, 2023, p. 2; Todorova, 2024, p. 4). For instance, students can use the "reply" function for single posts or subentries, thus creating conversational threads on a topic (Schluer, 2022a, p. 108). Additionally, the "thumbs up" or "like" function of forums enables quick reactions to the peer reviewers. It could also be used to rate the relevance of a topic or issue, thus providing a fast overview of the assessment for the feedback recipients (Schluer, 2022a, p. 108).

On the other hand, a flexible structure might be needed for certain types of assignments and feedback activities, which is why some users may find forum feedback difficult to structure and moderate (Pedrosa-de-Jesus & Moreira, 2012, p. 57). Hence, it could be challenging to provide appropriate feedback or feedback on existing comments, especially when many forum posts are entered in a short period of time, which is usually the case shortly before a deadline is approaching (Pedrosa-de-Jesus & Moreira, 2012, p. 72; cf. Mudau & van den Berg, 2023, p. 11). This high number of posts can be "overwhelming" (Mudau & van den Berg, 2023, p. 11; Torres & Satti, 2024, p. 40), with students therefore tending to "prioritize recent posts,

potentially overlooking older messages" in the forums (Mansour, 2024, p. 15969). In that respect, the forum interface can present additional challenges, making posts in different threads difficult to follow (J. Chen & Bogachenko, 2023, p. 9944; Pedrosa-de-Jesus & Moreira, 2012, p. 67; Schluer, 2022a, p. 106), thus requiring a multiple-windows view (Mansour, 2024, p. 15981). These and further considerations have implications on the pedagogical design and planning of digital feedback activities, as will be outlined next.

2.6.6. Considerations for Pedagogical Planning of Digital Feedback Processes

Based on the brief review of digital feedback methods in the preceding sections, it might be presumed that each one requires different sets of multiliteracies from their users. Literacy, once narrowly understood as "the ability to read and write" (OECD, 2000), has evolved into a broader concept of multiliteracies that acknowledges the multiplicity of communicative practices across different modes and contexts (The New London Group, 1996). More precisely, multiliteracies encompass linguistic, visual, audio, gestural, spatial and multimodal design elements (The New London Group, 1996, pp. 78–80, 83) to facilitate communication and enhance understanding in situated and dynamic contexts of use. This includes the ability to employ diverse media and communicative modes in the feedback process to ensure clarity and engagement while also showing awareness of possible limitations (Schluer & Liu, 2024, p. 139). Teachers and students should thus make informed choices about the most suitable communication modes (cf. Thorne, 2016, p. 188), given that digital tools offer varying affordances and simultaneously impose different constraints (Kern & Develotte, 2018, p. 11).

Also, students' perceptions of tools have been found to be influential on their engagement with them (Thorne, 2016; Yesmin & Siddique, 2023, p. 3). Furthermore, critical digital literacy is essential in recognizing how tools shape semiotic work and influence power structures in heterogeneous learner groups and classrooms (cf. the review by Schluer & Liu, 2024, p. 140). Students may reflect on, for instance, the influence of social, personal, cultural, and technological factors on the ways in which feedback-seeking, feedback provision, feedback comprehension, negotiation and use are facilitated or impeded (see also sections 2.2 and 2.4). As a consequence, tool choices or feedback practices might need to be re-negotiated, resulting in a possible change in the feedback format to achieve greater clarity, equity and inclusivity (cf. Schluer & Liu, 2024, p. 144). Feedback literacy thus necessitates an awareness of these factors to foster dialogic engagement and supporting students in developing strategies for meaningful and reflexive learning (Schluer & Liu, 2024, p. 140).

In educational contexts, these competencies are ideally developed in an integrated manner by giving students opportunities for practical exploration and reflection, especially when specific digital methods and tools are utilized for the first time or applied to unfamiliar assignment types. Overall, the pedagogical design involves considerations about the feedback directions, timing and tools and as well as training and coaching of the feedback participants

(Carless & Winstone, 2023, p. 154). Through a scoping review of feedback interventions in higher education, Brück-Hübner and Schluer (2023) arrived at seven main dimensions that can guide educators in the pedagogical planning process (see also Schluer & Brück-Hübner, 2025). Based on this empirical foundation, Schluer (2024d) created an interactive feedback taxonomy with reflective questions for the pedagogically driven design of feedback activities. It can be accessed at https://tinyurl.com/FeedbackTaxonomyEN/ and comprises seven possible starting points (see feedback design cycle by Schluer, 2024g, p. 89).

First, the feedback purpose relates to the objective or intention that is pursued through the exchange of feedback. Examples include correction, motivation, reflection or the promotion of feedback skills (Schluer, 2024g, p. 84; Schluer & Brück-Hübner, 2025, p. 301). Second, the feedback content concerns the nature of the comments and the assessment criteria that are applied (Schluer, 2024g, p. 85; Schluer & Brück-Hübner, 2025, pp. 300–301). These comprise considerations about the originality, structure, style, formatting, contents and linguistic aspects of the submitted work (ibid.) and may vary depending on the assignment type and on whether a product or process is being reviewed. Formative or summative assessments also have implications on the timing and frequency of the feedback. The third category therefore differentiates between these two major feedback types and specifies with what time delay and frequency feedback is communicated (Schluer, 2024g, p. 87).

In turn, the fourth and fifth dimensions of the taxonomy seek to aid in making adequate choices about the agents involved in the feedback exchange, notably including the roles and responsibilities of feedback providers and feedback recipients, respectively (Schluer, 2024g, pp. 82–84; Schluer & Brück-Hübner, 2025, pp. 299–300). Hence, the major question is, “who and how many persons will provide feedback to whom and to how many people?” Different feedback directions are conceivable, such as teachers to students, students to teachers, students to students, external mentors or affinity groups to students or teachers, technology (e.g. AI) to students or teachers, and vice versa (cf. Schluer, 2024g, pp. 82–84; Schluer & Brück-Hübner, 2025, pp. 299–300). In that regard, individual persons could provide feedback to single learners or groups of recipients, just like groups of providers can offer feedback to individual persons or groups of different sizes (cf. Schluer, 2024g, p. 82). Contemplations about the feasibility and suitability need to be made, resulting from different areas of expertise in particular subject fields or competence areas (Schluer, 2024g, p. 82). Accordingly, feedback providers might require training to various extents, which can occur in numerous ways, such as through handouts or tutorial videos, intensive training sessions and/ or ongoing coaching (Schluer, 2024g, p. 83). Apart from teacher-directed training, students could also have a voice, for instance by co-constructing relevant assessment criteria (p. 83). Likewise, feedback recipients can be trained through various means and to different degrees (p. 84). They might obtain guidance for follow-up exchanges with the feedback providers, for creating their action plans and for engaging in revisions (p. 84). Also, students’ performance in both feedback provision and

reception could be assessed (Schluer, 2024g, pp. 83–84). Moreover, feedback-seeking can be trained and evaluated and may occur in several ways. The sixth dimension collectively explores the feedback participants' actions and interactions before, during, and after the feedback event in the different roles that they adopt (Schluer, 2024g, p. 88).

For each of these phases, decisions about adequate media, modes and tools need to be made, as captured by the seventh dimension (Schluer, 2024g, pp. 86, 88). Feedback modes include written or visual, oral or auditory as well as audio-visual and multimodal options (Schluer, 2024g, p. 86; Schluer & Brück-Hübner, 2025, p. 302). Different media and tools, such as handouts, text-editors, videoconferences or evaluation software, draw on and thus enable or restrict the utilization and combination of modes as well as the timing with which feedback can be communicated (see Schluer, 2022a; 2024g, p. 86). Also, they might influence how many persons can participate in a feedback exchange, either in synchronous or asynchronous ways. The different dimensions are consequently interconnected in many ways, with decisions in one area having implications for the others (cf. Schluer, 2024g, p. 89).

While these considerations and interrelations may already pose challenges at the micro-level of individual feedback activities, they might be even more demanding at the meso-level of the course plan or curriculum (see dimensions by Boud & Dawson, 2023), especially when complex learning objectives are pursued. Altogether, a strategic course design and task sequencing is needed that is beneficial in facilitating feedback loops and spirals (Ajjawi et al., 2019, p. 249) and fostering continued learner involvement (see engagement dimensions in section 2.4.9). Indeed, certain methods might be more appropriate at the initial stages of a project or writing task, while others could be better suited for later phases (C.-F. Chang, 2012, p. 73). Therefore, in this research colloquium, multiple digital peer feedback methods were used for different purposes. They included cloud feedback in online editors and on digital boards; recorded audio, video or screencast feedback; as well as forum feedback. The overarching question for this study was: What is an appropriate match of digital tools and phases of the research (planning) process?

Another question relates to the feedback producers that are not necessarily confined to teachers or supervisors. For example, Vuogan and Li (2022) suggested that peer feedback could be useful at the stages of idea or topic development on the one hand as well as before the submission of the final draft on the other hand (pp. 20–21). At early stages, peer feedback can help identify initial issues with clarity and encourage "divergent thinking", while instructor feedback can challenge ideas and promote "evaluative thinking" at a later stage (Hsieh & Hill, 2022, p. 1043). Moreover, teacher feedback and learning analytics can be valuable for tracing learners' development across the different stages of the research planning and writing process. Finally, self-assessment, e.g. when paired with automated spelling and grammar checkers or more advanced AI technologies, could be useful for eliminating linguistic errors during writing or proofreading.

Moreover, students' attention to positive and negative feedback can also vary across different stages of revisions (Wu & Schunn, 2021, p. 386). For instance, at the planning stage, they might be more susceptible to negative comments, whereas praise can fulfill important motivational functions when it comes to the actual implementation (Wu & Schunn, 2021, p. 385). However, these aspects still deserve further investigation, especially with regard to digital feedback at different phases of the research planning process. Likewise, it could be presumed that students' heterogeneous backgrounds and interests might turn into assets during peer feedback activities in the research (planning) process (cf. Huber, 2013, p. 26), as they contribute a variety of perspectives on a particular topic or phenomenon (cf. Mandl & Reinmann-Rothmeier, 1998, p. 198, quoted in Huber, 2013, p. 16). This leads us to the research gap that will be addressed by the current work.

2.7. Research Gap and Research Questions

Generally, the utilization of digital technologies might facilitate and enrich peer feedback processes in manifold ways. Even though digital feedback has become increasingly common, especially since the Covid-19 pandemic (Y. Zhao et al., 2024, p. 524), there is still a relative scarcity of studies that examine peer feedback dialogues and their impact in detail (see e.g. Y. Zhao et al., 2024). Even less so, digital peer feedback has been investigated as part of the presumably solitary process of thesis writing and research planning.

However, not only the feedback direction (peer feedback as compared to the more common instructor-to-student feedback) and context are under-researched, but also the digital formats. While most peer feedback studies focused on written modes, digitally recorded peer feedback is rare in the prior literature (see e.g. Schluer, 2020b; 2022b). Moreover, the majority of research was based on data from perceptual or attitudinal student surveys, but was only rarely complemented by detailed analyses of the actual feedback (see e.g. Cunningham, 2019a, on teachers' screencast feedback; Mudau & van den Berg, 2023, on forum discussions; Schluer, 2021b; 2022b, on peer screencast feedback). Often, the investigation of feedback artifacts was merely mentioned as a desirable future avenue (e.g. in the forum feedback studies by Tawalbeh & Al-Husban, 2023, p. 518, and by Tseng & Er, 2024, p. 145). Furthermore, the increasing heterogeneity of the student population in peer feedback has not been thoroughly considered in much prior work, especially in digital learning environments (cf. Mieg, 2017, p. 29).

The present research thus enters an under-explored field in numerous ways: the research participants (graduate and postgraduate novice researchers with heterogeneous profiles and interests), the feedback direction (peer feedback), the feedback objects (different intermediary products of research planning), the digital media and modes (digital boards, recorded feedback, online forums) as well as their sequencing or mapping to distinct stages of the research planning process. In that regard, the aim of the digital feedback intervention is to improve the

learning support while students are developing their research topic and research plan. This may ultimately increase their learning gain and the quality of their final theses.

In the present study, the focus will be set on the technology-mediated peer feedback exchanges in the so-called TESOL Research Colloquium (TRC). It concentrates on feedback on digital boards (notably Padlet), digitally recorded feedback (audio, video, screencast), and feedback in online forums (here: within OPAL, the "Online Platform for Academic Learning and Teaching" in Saxon Higher Education, developed by BPS Bildungsportal Sachsen GmbH). On the one hand, this study is interested in students' perceptions of the advantages, disadvantages, and learning gain from the peer feedback received through these digital tools. On the other hand, it examines the actual feedback that was produced by the students in each mode. More specifically, the research questions are as follows:

(1) How do students exchange and evaluate digital peer feedback on digital boards during the phase of topic identification and delimitation for their thesis?
(2) How do students exchange and evaluate digitally recorded peer feedback (via audio, video, or screencast files) during the phase of research planning and drafting?
(3) How do students exchange and evaluate digital peer feedback in online forums during the phase of their research proposal presentation?
(4) Overall, how do students assess their learning gain from the research colloquium?

The first three questions primarily serve the purpose of improving the learning support and pedagogical design by focusing on students' (self-assessed) usefulness of the feedback in different digital formats, i.e., whether and why it appears useful from the participants' point of view. In addition, the data obtained for the fourth question can be informative for an accountability-oriented evaluation, i.e. by comparing the results to previous years in which the digital feedback design had not yet been applied. More detailed assumptions and hypotheses as well as comprehensive information on the methodology that was adopted will be presented in the next chapter to seek answers to the above-mentioned research questions.

3. Methodology

The current section provides details about the methodology, starting with a description of the teaching approach, which rests on inquiry-based learning in an open feedback environment using various digital feedback procedures (sections 3.1 to 3.4). Afterwards, the study context, research design, instruments and analytical methods will be presented (sections 3.5 to 3.11).

3.1. Introductory Remarks on Pedagogical Design

Over the past decades, "constructive alignment" has become a core principle for curriculum design in higher education (see Biggs & Tang, 2011). This framework was first proposed by Biggs (1999, as cited in Gallagher, 2017, p. 2) and is grounded in constructivist learning theories as well as in principles of instructional alignment (Biggs & Tang, 2011, p. 95). More specifically, constructive alignment means that teaching and learning activities (TLAs) as well as assessment tasks (ATs) are aligned to the intended learning outcomes (ILOs) (Biggs & Tang, 2011, p. 11) so that "all components […] support each other" (p. 109) within a cohesive pedagogical design. Ideally, such a congruent instructional design encourages students to participate actively in learning and assessment activities that are in accord with the course objectives (Biggs, 2003, p. 1).

In that respect, the definition of the ILOs is the central first step from which suitable ATs and TLAs are derived (cf. Biggs, 2003, pp. 2–3; Biggs & Tang, 2011, pp. 14, 100, 104). ILOs specify not only the knowledge or skills students should acquire but also the depth of understanding and performance expected (cf. Biggs, 2003, p. 2; Biggs & Tang, 2011, pp. 100–101, 109; European Commission, 2015, p. 7, cited by Lasrado & Kaul, 2021, p. 61). As part of outcomes-based teaching and learning (OBTL), this focus shifts the emphasis from mere content coverage to the learning that students should demonstrate, thus making OBTL "not so much a matter of what topics to teach, but what outcomes students are supposed to have achieved after having been taught" (Biggs & Tang, 2011, p. 14).

Overall, ILOs can be formulated for desired graduate attributes at the institutional level (e.g. of the university), at the program level of a particular degree program, as well as at the level of individual courses or course units (Biggs & Tang, 2011, p. 113). ILOs are typically expressed in student-centered language, describing desired competencies in terms of actions or verbs (see Biggs & Tang, 2011, pp. 100, 123–125). They specify "not only *what* is to be learned, the topic, but *how* it is to be learned and to what standard" (Biggs & Tang, 2011, p. 109; original emphasis). These verbs reflect the kind of learning activities that will be integral to both teaching and assessment (Biggs & Tang, 2011, p. 109) to effectively unite the curriculum's objectives with pedagogical strategies (Biggs, 2003, p. 2). Hence, the teacher's task is to select or design appropriate TLAs as well as ATs that allow students to develop and demonstrate the desired

outcomes (Biggs, 2003, p. 1; Biggs & Tang, 2011, p. 108). Gallagher (2017) synthesized the key steps as reflective questions for teachers as follows:

- "What do we want the student to be able to do?
- How will we know if the student can do what is intended and what opportunities will we provide to allow him or her demonstrate this?
- What activities will we devise to enable the student to achieve the intended outcomes and how can we best ensure that these activities reflect or correspond to how we will eventually assess the student?" (Gallagher, 2017, p. 8)

For the TRC, the ILOs were specified as follows (slightly adapted from Schluer, 2024i, p. 54):

By the end of the course, students should be able to

- identify and delimit a research topic as well as specify the research question(s) for their thesis,
- describe different research methods and select those that fit their research goals,
- sketch a research design and timeline for their research project,
- (analyze empirical data, also by using specialized software for quantitative and qualitative analysis),
- present their research project ideas and/ or thesis in written, oral and multimodal ways,
- provide feedback to their fellow students by using various (digital) feedback methods and engage in critical discussions.

The fourth point is put in brackets here because it is mainly relevant for students at advanced stages of their research project and thus not the prime focus for everyone who is attending.

For a successful implementation, Biggs and Tang (2011) highlighted four central aspects (p. 23). First, teachers and students need to gain clarity about the ILOs and possible ways of achieving them. Second, the perceived relevance of the ILOs is crucial, i.e. students should feel a need to achieve those outcomes. Ideally, they feel intrinsically motivated to begin and continue engaging "meaningfully and appropriately" (Biggs & Tang, 2011, p. 26) in the activities by recognizing their value for reaching the objectives (pp. 36, 54, 66). Third, and conducive to the latter is a positive classroom climate in which "students feel free to focus on the task" instead of pressured or anxious about assessment (Biggs & Tang, 2011, p. 23; cf. pp. 37, 55).

Fourth, to encourage higher-order thinking and deep-level processing, dialogic design elements appear fruitful which require students' active engagement, such as through collaborative tasks (Biggs & Tang, 2011, p. 23) and mutual feedback. This, in turn, can enhance social motivation and the quality of learning (cf. Biggs & Tang, 2011, p. 37).

Since feedback plays a key role in the learning process (Biggs & Tang, 2011, p. 64), it should also constitute a crucial component in the constructively aligned curriculum. As

Gallagher (2017) argues, effective feedback processes need to be consistent with the ILOs, the ATs and the TLAs (p. 2). Feedback guides students towards the intended learning outcomes and contributes to enhancing their engagement in the learning process. Moreover, dialogic feedback between teachers and students offers ongoing opportunities to assess the alignment of learning activities, assessments, and intended outcomes, and to re-align them when necessary (Gallagher, 2017, pp. 2–3, 5). Dialogic teacher and peer feedback help to promote an iterative cycle of clarification and adjustment, fostering deeper understanding and assessment literacy among students (Gallagher, 2017, pp. 4–5). This responsiveness and dynamic alignment facilitate meaningful, student-centered learning and are also critical to teachers' growth as reflective practitioners (cf. Dewey, 1910, and Schön, 1983, in section 5.7.1) as well as continuous quality enhancement of pedagogical designs (cf. Biggs & Tang, 2011, p. 294).

In view of the specific ILOs of the TRC, the following instructional approaches, TLAs and ATs appeared suitable, as will be explained in more detail in the subsequent sections:

- active engagement through inquiry-based learning with immediate relevance for the intended learning outcome and final assessment (section 3.2),
- an open learning and feedback environment (section 3.3),
- the alignment of assignment and feedback procedures in a digitally mediated learning environment (section 3.4).

Naturally, the efficacy of the suggested constructive alignment needs to be tested through research (e.g. design-based research, see section 5.8.4) and reflective practice (section 5.7.1), which will presumably lead to modifications in other learning contexts. These aspects will be addressed and discussed in the remainder of this book.

3.2. Inquiry-based Learning and Learning by Researching

> "Probably the most obvious way for undergraduate students to engage in research is to undertake final-year dissertation or capstone research and inquiry projects." (Healey & Jenkins, 2009, p. 56)

While this quote clarifies the immediate relevance of inquiry-based learning (IBL) for the current study, IBL is also of more general importance in the learning and teaching process. The next sections therefore review the breadth of this notion (section 3.2.1) as well as pertinent models (3.2.2) before deriving considerations about its suitability for the pedagogical aims that are pursued in the present study (section 3.2.3).

3.2.1. Definitions of Inquiry-Based Learning

Generally, IBL is an educational approach that emphasizes students' active engagement, critical thinking and problem-solving skills within the learning process (Hofhues et al., 2014, p. 21;

Weller, 2023, n.p.). Rooted in constructivist pedagogy and experiential learning (Dewey, 1916; Piaget, 1954; Vygotsky, 1978), IBL shifts the focus from teacher-centered instruction to student-centered exploration. This method encourages learners to formulate questions, investigate topics, and develop a deep understanding of concepts through a process of inquiry (Pedaste et al., 2015; Sonntag et al., 2017).

Over time, IBL has been defined through varied terminologies, such as "research-based" and "inquiry-oriented" learning, sometimes synonymously, sometimes with distinct meanings. Healey and Jenkins (2009, based on Healey, 2005), for instance, proposed two major axes, one about students' roles and the other one about the emphasis that is placed on research (p. 7). This resulted in four primary approaches: (1) *research-led* (learning about the contents of current research), (2) *research-tutored* (discussing the contents of research), (3) *research-oriented* (developing research skills), and (4) *research-based* (conducting research) (Healey & Jenkins, 2009, pp. 6–7). The first two foreground content learning, whereas the latter two emphasize engagement with the research process. Furthermore, the second and fourth require and foster greater student engagement as compared to the first and third one. Particularly, "research-based" learning emphasizes active student participation in research (cf. literature review by Mieg, 2017, pp. 21–23). These major types are positioned on a continuum of increasing agency in Figure 2 (adapted from Healey & Jenkins, 2009, p. 7).

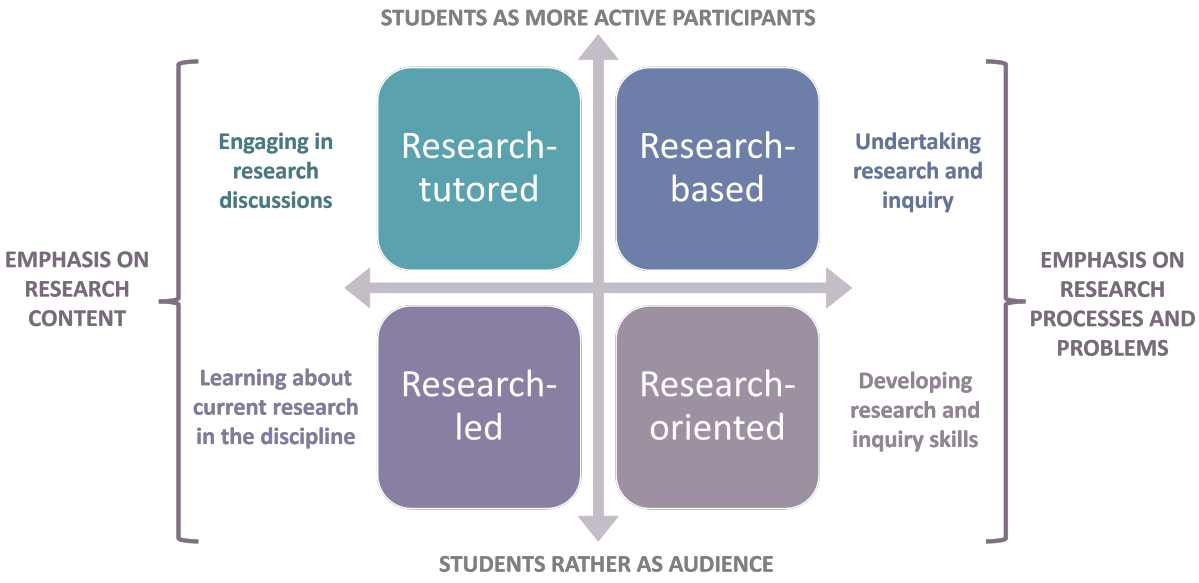


Figure 2: Types of Inquiry-Based Learning (According to Healey & Jenkins, 2009, p. 7)

Pedagogically, IBL integrates the research cycle with experiential learning (following Kolb, 1984, and Wildt, 2009, cited in Mieg, 2017, pp. 26–27). This can foster a scholarly mindset among students, acculturating them into a research community (Hodge et al., 2008, p. 2, quoted by Healey & Jenkins, 2009, p. 37). To develop the students' knowledge, skills and mindset, teachers should scaffold the process as facilitators and coaches (Healey & Jenkins, 2009, p. 25).

Ancient roots can already be found in the Socratic method, wherein "the classroom experience is a shared dialogue between teacher and students in which both are responsible for pushing the dialogue forward through questioning" (Ross, 2003, p. 1, quoted in Friesen & Scott, 2013, p. 6). Likewise, "[q]uestions are the heart of inquiry-based learning" (Weller, 2023, n.p.; Gholam, 2019, p. 112), aiming to encourage students to embark on a journey of discovery and foster a sense of curiosity in their educational experiences.

The importance of social interactions for cognitive development was further underscored by Vygotsky's (1978) socio-cultural theory. Similarly, Piaget and other cognitivists highlighted that learning occurs as an active process "within and influenced by the learner" (Bybee et al., 2006, p. 15). Moreover, John Dewey, a highly influential figure in the field of education, emphasized the importance of experiential learning and reflective thinking to connect theory with practice. With a background as a science teacher, he outlined several characteristics of reflective thinking that have nowadays turned into fundamental aspects of IBL: "(1) defining the problem, (2) noting conditions associated with the problem, (3) formulating a hypothesis for solving the problem, (4) elaborating the value of various solutions, and (5) testing the ideas to see which provide the best solution for the problem" (Bybee et al., 2006, p. 5).

In IBL, students consequently perform many of the actions that scientists engage in (Abdi, 2014, p. 37; Keselman, 2003, quoted by Pedaste et al., 2015, p. 48; Sonntag et al., 2017, p. 14), which can make them feel like "junior scientist[s]" (Duran & Dökme, 2016, p. 2888). Students are thus at the center of the research and learning experience and engage in scientific reasoning (Duran & Dökme, 2016, p. 2888). This requires them to take ownership of their progress through questioning, investigation, analysis, reflection, and communication (Gholam, 2019, pp. 113–114, 116; de Jong & van Joolingen, 1998, cited by Pedaste et al., 2015, p. 48; Weller, 2023). They proceed through some, several or all stages of the research process (see e.g. Huber, 2013, pp. 9, 15; Mieg, 2017, pp. 25–27; Muckel & Kergel, 2014, p. 13; Reinmann, 2017, p. 118), such as the

(1) development of a research topic, research goal and research questions,
(2) search for and review of relevant literature,
(3) methodological design, including the selection of data collection methods, development of research instruments and analytical methods (plus design of learning materials and course plans if teaching interventions are to be conducted),
(4) implementation of the (teaching intervention and) research study,
(5) documentation and analysis as well as presentation and publication.

Thus, students ideally experience the entire research process and reflect on their progress regularly (cf. Pasternack, 2017, p. 40). By defining goals and monitoring their progress, students' metacognitive abilities can be enhanced (Bransford et al., 1999, pp. 10–13, quoted in Bybee et al., 2006, p. 15). In that regard, critical thinking is a core part and outcome of IBL (cf. Duran &

Dökme, 2016, p. 2888; Gholam, 2019, p. 116). Furthermore, communication and collaboration skills are fostered (cf. Gholam, 2019, p. 116), e.g. by discussing their topics and findings with peers, exchanging feedback or conducting projects collaboratively (cf. Bybee et al., 2006, p. 11). For instance, in their 5E model, Bybee et al. (2006, p. 11) integrated the principles of cooperative learning (cf. Johnson & Johnson, 1993) into the phase called "Exploration" (see section 3.2.2 below).

Throughout the inquiry process, the teacher assumes the role of a facilitator, who guides and supports the students during their investigative journey, while maintaining a balance of freedom and structure (Weller, 2023, n.p.; cf. e.g. Duran & Dökme, 2016, p. 2891; Muckel & Kergel, 2014, p. 13). The extent of that "guided inquiry" (Duran & Dökme, 2016, p. 2891) or "scaffolding" will vary depending on the learners' needs, as captured by Vygotsky's (1978) notion of the ZPD (cf. Healey & Jenkins, 2009, p. 25). Related to the positive impact of scaffolding on learning is the role played by formative assessment (e.g. Bransford et al., 2000, as well as Hattie, 2009, cited by Friesen & Scott, 2013, p. 23). As Friesen and Scott (2013) remark, "scaffolding activities, formative feedback loops, and the adoption of powerful questioning strategies [should] guide the learning process" (p. 25) in inquiry-based education.

Earlier, other educators such as Jerome Bruner have already furthered the discourse on IBL. For instance, Bruner's (1966) work on constructivism and the spiral curriculum has influenced the integration of inquiry into course design. His ideas underscore the importance of revisiting and deepening understanding over time through a process of inquiry (see inquiry cycle by Pedaste et al., 2015). Indeed, several studies affirm the effectiveness of IBL as an instructional approach (Pedaste et al., 2015, p. 48; e.g. Hattie, 2009, p. 208, cited by Friesen & Scott, 2013, p. 21). Hattie (2009) defined it as

> "the art of developing challenging situations in which students are asked to observe and question phenomena; pose explanations of what they observe; devise and conduct experiments in which data are collected to support or contradict their theories; analyze data; draw conclusions from experimental data; design and build models; or any combination of these." (Hattie, 2009, p. 208, as quoted by Friesen & Scott, 2013, p. 21)

Accordingly, the learning outcomes of IBL can be manifold, comprising the development of research skills, social and affective aspects, as well as metacognitive thinking and self-regulated learning (see Gess et al., 2017, for a detailed description). Much also depends on how many phases of the inquiry cycle are integrated into the pedagogical design. The next sections will therefore address these issues.

3.2.2. Models of the Inquiry Cycle

Overall, several models of IBL co-exist with varying terminology. One common example is the 5E model by Bybee et al. (2006), which labels the different phases as Engagement, Exploration,

Explanation, Elaboration, and Evaluation. Another inquiry cycle proposed by White and Frederiksen (1998) likewise comprises five phases, called "Question, Predict, Experiment, Model, and Apply" (as cited by Pedaste et al., 2015, p. 48). To gain more clarity, Pedaste et al. (2015) systematically reviewed 32 IBL publications and detected a total of 109 different terms (p. 51). They represented 34 inquiry activities which Pedaste et al. (2015) condensed into five main phases: (1) Orientation, (2) Conceptualization, (3) Investigation, (4) Conclusion, and (5) Discussion (see illustration in Pedaste et al., 2015, p. 56).

In the first phase, (1) Orientation, the focus lies on creating interest and curiosity about a particular topic (Pedaste et al., 2015, p. 54; cf. Gholam, 2019, p. 112; Weller, 2023, n.p.). The topic can originate from the learners themselves, the teacher or the wider environment (Scanlon et al., 2011, cited by Pedaste et al., 2015, p. 54). Eventually, this phase culminates in the formulation of a problem statement (Pedaste et al., 2015, p. 54).

Second, during (2) Conceptualization, the students strive to understand the underlying concepts related to the identified problem (Pedaste et al., 2015, p. 54). Depending on the kind of problem, the procedures and outcomes of this phase will vary (p. 55). On the one hand, it can consist of questioning, which would result in the formulation of a specific research question or more open-ended questions (p. 54). On the other hand, it could comprise hypothesis generation and thus lead to a testable hypothesis (Pedaste et al., 2015, p. 54).

These questions and hypotheses, respectively, are tackled in the subsequent phase of (3) Investigation. Generally speaking, curiosity is here transformed into action (Scanlon et al., 2011, quoted by Pedaste et al., 2015, p. 54). Depending on the kind of inquiry, the investigation phase could entail exploration (of the generated questions) or experimentation (of the hypotheses generated in the preceding phase). For both, appropriate planning is key, e.g. concerning the required resources of time, money, and materials (Pedaste et al., 2015, p. 57). Moreover, the investigation phase involves the subphase of data interpretation during which the learners make meaning out of the collected data and synthesize their knowledge gained (as reviewed by Pedaste et al., 2015, p. 55).

In the next phase called (4) Conclusion, the learners revisit their initial research questions or hypotheses and answer them based on the conclusions they draw from their study (Pedaste et al., 2015, p. 55). They state the extent to which their questions were answered or to which their hypotheses were supported by the data (p. 55). Overall, this can result in "new theoretical insights" (Pedaste et al., 2015, p. 55).

Finally, the phase of (5) Discussion can include two sub-processes of (external) communication and (internal) reflection (Pedaste et al., 2015, pp. 53, 55). Communication can involve the presentation of findings to others and the reception of feedback from them (p. 55). Reflection, in turn, is an internal process focusing on self-analysis and deriving improvements for future inquiry cycles ("What did I do? Why did I do so? Did I do well? What are the other options in a similar situation?", Pedaste et al., 2015, p. 55). The phases of Conclusion and Discussion

may overlap, for example when conclusions are drawn after communication with others (p. 53). Moreover, evaluation processes can be positioned between conclusion and discussion phases, notably between conclusion and (internal) reflection (Pedaste et al., 2015, p. 53).

Furthermore, apart from being a separate phase ("discussion on action"), discussion can occur at any stage of the IBL process as "discussion in action" (Pedaste et al., 2015, p. 57). Thus, by analogy to Schön's (1987) notion of "reflection-on-action" and "reflection-in-action", Pedaste et al. (2015, p. 57) suggested the terms "communication-on-action" and "communication-in-action". Hence, communication and feedback as well as reflection can be incorporated at all stages, with learners sharing their ideas, progress and outcomes continuously. For example, Marshall (2013) "explicitly incorporate[d] formative assessment (continually checking in with students) and reflective practice (now where?) into each phase" of inquiry (which Marshall called "Engage, Explore, Explain, and Extend", as cited by Gholam, 2019, p. 116). This is in line with the instructional approach taken in the current study. Teachers can facilitate these processes by granting opportunities for exchanges with peers and offering reflective activities to enhance meta-cognition and self-regulation (cf. de Jong & Njoo, 1992, cited by Pedaste et al., 2015, p. 57; see also Brown & Campione, 1987, quoted in Bybee et al., 2006, p. 12). In the end, the quality of reflection can have an impact on students' improvements and the conclusions they draw (Pedaste et al., 2015, p. 57).

Likewise, several cycles are possible overall as well as during specific phases, which illustrates that the IBL framework can turn into a flexible pedagogical approach (Pedaste et al., 2015, p. 57). For example, if the data collection was not as feasible as planned, learners can return to the conceptualization phase to reinspect and restate their questions or hypotheses, which might then lead to modifications or new input for the investigation phase (p. 57). Also, new ideas emerging from data interpretation can make learners revisit earlier phases (p. 57). Furthermore, the starting points of the inquiry cycle may vary, e.g. by openly exploring a phenomenon first and then moving to its conceptualization (Pedaste et al., 2015, p. 57).

In addition to the five main phases, Pedaste et al. (2015) identified "two more future-oriented stages" (p. 53) that did not belong to the IBL process as such, i.e. "application and expansion" and "starting new questions to investigate".

Altogether, the inquiry cycle represents a structured but flexible framework that guides the progression of learning through the different stages of scientific inquiry (Pedaste et al., 2015, p. 48). It typically involves a cyclical process, wherein students engage in activities such as formulating questions, conducting research, collecting data, analyzing information, and presenting their findings (Pedaste et al., 2015). This iterative approach not only fosters a sense of ownership over the learning process but also cultivates critical thinking skills and the ability to apply knowledge in real-world contexts (Hwang & Chang, 2011, cited by Duran & Dökme, 2016, p. 2888; Pedaste et al., 2015, p. 48). As such, it aligns with reflective practice and can hence not only foster students' research skills, but also familiarize them with prospective teachers'

professional practice of critically reflecting on their teaching (Schön, 1983; Farrell, 2015; 2018; 2021; Farrell, 2022). Furthermore, through an adequate pedagogical design, IBL can contribute to students' communicative and collaborative skills, e.g. by means of regular group discussions and peer feedback on different steps and accomplishments in the research process (cf. Pedaste et al., 2015, p. 57). The next section will therefore advance some considerations for the pedagogical implementation in the current study context.

3.2.3. Considerations for Pedagogical Implementation

While it was mostly applied in science education (see Bybee et al., 2006), IBL has turned into a flexible instructional approach that is used in many subjects and topic areas (Duran & Dökme, 2016, p. 2889). In the realm of research planning, the incorporation of inquiry-based learning strategies can be particularly advantageous. They allow learners to explore potential research topics and methodologies, relevant resources as well as the particularities of academic writing through active investigation. More precisely, the following considerations underscore the suitability of IBL for supporting Master and PhD students in the development of their research plans and theses as part of a research colloquium in higher education:

Active Engagement and Ownership: IBL encourages students to actively engage in the research process by formulating research questions, identifying gaps in the literature, and conceptualizing their research projects (cf. the review by Pedaste et al., 2015). This active involvement instills a sense of ownership, motivating students to take responsibility for their intellectual inquiries (cf. Mieg & Lehmann, 2017, p. 35; Spies, 2017, p. 134).

Critical Thinking and Problem-Solving: Research colloquia utilizing IBL provide a platform for students to enhance their critical thinking skills (see above; e.g. Hofhues et al., 2014, p. 21). By independently or collaboratively investigating relevant literature and refining their research questions, students can develop the ability to critically evaluate existing knowledge, identify research gaps, and formulate methodological approaches to address those gaps.

Collaborative Learning: Research is not only an individual, but also a social process (Hofhues et al., 2014; Huber, 2013, p. 11; Reinmann, 2013, p. 45), taking place within academic communities, with research results often having collective value. Students therefore not only need to adopt responsibility for their own learning, but also social responsibility (Huber, 2013, p. 13). Accordingly, IBL emphasizes collaborative learning, fostering an environment where students can engage in meaningful discussions, share insights, and receive constructive feedback (Pedaste et al., 2015, p. 55). In that respect, research colloquia provide a pedagogical frame for collaborative exploration (cf. Bybee et al., 2006, p. 1, with reference to Johnson et al., 1986), enabling students to benefit from diverse perspectives and refine their research ideas through peer interactions. Such an engagement with multiple viewpoints on a particular topic can eventually lead to deeper learning and mental agility in problem-solving (cf. Mandl & Reinmann-Rothmeier, 1998, p. 198, cited in Huber, 2013, p. 17).

Heterogeneous Backgrounds and Interests: In IBL, students not only benefit from engaging with experienced researchers, but also from their peers' heterogeneous backgrounds, skills, and interests (cf. Reinmann, 2013, p. 47). Considering students' varied knowledge and expertise concerning particular topics, teaching and research methods, they might mutually learn from each other in multiple ways (Spies, 2017, pp. 129–130, 134). Satilmis (2017) therefore argued that IBL should not only consider and comprise aspects of heterogeneity, but also foster such diversity, e.g. through participatory approaches (p. 423). Accordingly, she underscored that heterogeneity can be both a pedagogical advantage and a conceptual foundation of IBL, advocating for multi-perspectivity as a fertile foundation for exploration and growth within contexts of academic inquiry (Satilmis, 2017, p. 425). It also represents a "humanizing pedagogy" where different "life knowledges" (Fataar, 2016, p. 19, cited in Essa et al., 2023, p. 511) and "voices are valued" (Mansour, 2024, p. 15968). This inclusive approach fosters a supportive and intellectually stimulating environment that aims to enhance students' research competencies.

Gradual Progression and Reflection: The iterative nature of IBL aligns with the gradual progression inherent in the development of a Master or PhD thesis. Through successive cycles of inquiry, students can refine their research questions, methodologies and conceptual frameworks (cf. Pedaste et al., 2015, p. 57; see inquiry cycle in section 3.2.2). Regular reflection and feedback sessions within the colloquia facilitate continuous improvement and refinement of research ideas. The development of critical-reflective skills is seen as crucial for the learning and research process (cf. Mieg & Lehmann, 2017, p. 36).

Integration of Language Skills: In the context of English language teaching, the application of IBL in research colloquia provides opportunities for fostering prospective teachers' language skills, including research-related vocabulary and concepts. Students engage in peer feedback exchanges, plenary discussions, proposal writing and oral presentations to advance their academic language skills (Schluer, 2020b; 2021b; 2023b; 2024i).

Preparation for Independent Research: IBL in research colloquia serves as a preparatory phase for independent research, which is a major aim of postgraduate degrees (e.g. Millin et al., 2022, p. 233; T. Wang & Li, 2011, pp. 101–102). Notably, by actively participating in the development of their own and their peers' topics, students acquire the skills and confidence necessary to embark on their independent research projects as part of their current degree or after graduation.

Systematic Integration of Peer Feedback: Throughout this process, additional benefits can be gained from the incorporation of peer feedback as a pedagogical tool. As a form of collaborative learning, it can enhance the depth of inquiry, critical thinking and reflective practice among students (see section 2.3.2). Peers might contribute critical questions, provide emotional support and motivation, as well as offer suggestions that help to refine or expand the research ideas (cf. Woodrow, 2020, p. 6). To produce feedback, students need to engage with

relevant criteria for academic research and thesis writing and apply them to their peers' submissions (Huisman et al., 2018, p. 956; Nicol et al., 2014, p. 117). At the same time, such a critical engagement is beneficial for their own work and metacognitive development (Nicol, 2010, p. 509; Sadler, 1989, p. 129; 2010, pp. 541–548). They might become more aware of scholarly conventions, but also develop skills in self-regulated learning (D. L. Butler & Winne, 1995). Thus, when students regularly seek, provide and respond to feedback, a culture of continuous improvement could be cultivated, which is a key aspect of the research process.

Utilization of Digital Tools: Moreover, advancements in digitalization need consideration in contemporary education. Peter and Stout (2011) extended Bybee et al.'s (2006) 5E model to a 6E model, which included "e-learning" as an additional component (as cited in Gholam, 2019, p. 117). In fact, digital media are nowadays an integral part of research (Heidkamp, 2014, p. 58; Hofhues et al., 2014, pp. 27–28; Muckel & Kergel, 2014, pp. 14–15) so that e-learning can permeate and enhance all phases of IBL, including problem definition, conceptualization, exploration, analysis and communication (Mäeots et al., 2008, cited by Pedaste et al., 2015, p. 48; Peter & Stout, 2011, pp. 10–11, quoted in Gholam, 2019, p. 117).

The current study sets out to explore in how far different stages of the inquiry-based research process can benefit from the use of specific digital feedback methods. An important precondition for this is the creation of a trustful atmosphere and students' familiarization with (digital) peer feedback (see section 2.3.3). The next section will therefore be devoted to the description of the open feedback environment and the particular feedback procedures that were adopted.

3.3. Open Feedback Environment

The intervention rests on the idea of an "open feedback environment" (Wood, 2019; 2023) that is facilitated by cloud-based technologies in the educational setting. "Open" means that not only the teacher, but all students can access everybody's submissions as well as the feedback they have provided and received (Wood, 2019, p. 57). This is enabled by a common cloud storage (course cloud) and specific cloud-based applications for draft editing and collaboration. While Wood (2019; 2021; 2023) utilized Google Classroom as a learning management system (LMS), the LMS of the university at which the current research was conducted has a more limited scope of features. However, folders on the protected university cloud can be set up easily and were therefore implemented in the present study. The intention was to create a "dialogic space, where questioning, challenging, and building on others' ideas are encouraged" (Mansour, 2024, p. 15988).

Similar to the "community-based multi-peer feedback" approach adopted by Gao and Chen (2025, p. 22; emphasis omitted), participation in the TRC involved an open sharing of asynchronous feedback (p. 21). Feedback shared openly can help to reduce power imbalances between teachers and students, as learners are enabled "to actively process, use, and

contribute knowledge" in various ways (Gao & Chen, 2025, p. 22, citing Yang, 2011, 2016). Furthermore, it can be conducive to creating a learning community (cf. Gao & Chen, 2025, pp. 22–23). The students in Gao and Chen's (2025) study provided feedback in a single-blind manner, i.e. their name was visible, but they did not know whose work they were reviewing (p. 27). In the present research, though, the peer exchanges usually were not anonymous in either direction.

Such an open approach naturally presupposes mutual trust and a willingness to share materials and comments with others (Schluer, 2023b, p. 10). Even though students might experience initial discomfort, as Wood (2019, p. 95) acknowledged (cf. also C. T. H. Lien, 2023, p. 11), his students ultimately adapted to the open environment, emphasizing that "the benefits outweighed the disadvantages" (p. 95). Notably, they profited "from others' approaches to learning, thinking, ways of responding to feedback and viewing others' teacher feedback" (Wood, 2019, p. 95; cf. C. T. H. Lien, 2023, p. 9; see also section 2.3.2 on vicarious learning). Moreover, motivation derived from comparing their progress with peers and observing others' work emerged as common themes in his study. This "compare and contrast" process (Wood, 2019, p. 127) "helped them gauge their progress against others" (p. 104), leading to additional boosts of motivation, critical thinking and improvement. Furthermore, the online environment allows students to "give and receive feedback in an interactive manner" (teacher cited in Carless et al., 2011, p. 402). Altogether, then, it appears that the open-folder environment could support vicarious learning, facilitate collaborative feedback and encourage engagement with the feedback (Wood, 2019, pp. 104, 107; 2021, p. 1184; 2023). It also aligns with the idea of a "community of practice" or "inquiry community" approach that benefits from "making learners' work visible and accessible" (Chong & Reinders, 2023, p. 8; emphasis omitted). For these reasons, an open digital feedback environment was chosen for the present study.

3.4. Assignments and Feedback Procedures

In view of the complexity of the research process, a multi-stage design appeared suitable, including a series of interconnected tasks that progressively built on each other (cf. Chung & Choi, 2021, p. 8). It should be accompanied by a transparent rationale for the different assignments as well as a clear overview of the procedures (cf. Mieg, 2017, p. 19), especially for students who embark on their thesis journey for the first time. Simultaneously, students need to be afforded sufficient freedom in planning and conducting their individual research projects (Wiemer, 2017, p. 48). Given these potentially conflicting demands, the teaching approach must balance structure with autonomy, while incrementally fostering students' autonomy through adequate modelling, scaffolding and coaching (cf. Fastré et al., 2013, p. 621). In that respect, the teachers' role as coach as well as the significance of regular feedback and opportunities for reflection have been emphasized in the literature on IBL (Mieg, 2017, p. 19; Wiemer, 2017, p. 48; cf. T. Wang & Li, 2011, p. 102; see section 3.2) and sustainable assessment (see section 2.3.3; e.g. Carless et al., 2011, p. 406). Instructors thus play a crucial role in designing suitable

pedagogical frameworks and initiating as well as facilitating learning opportunities that gradually build students' autonomy as researchers and reflective practitioners (cf. Wiemer, 2017, p. 48).

To achieve a constructive alignment of the teaching and learning activities (TLAs), assessment procedures (ATs) and intended learning outcomes (ILOs) (see Biggs & Tang, 2011, in section 3.1), each stage of the research process was linked to specific learning tasks, corresponding to typical research outputs or intermediary products of research planning (cf. Zürcher Framework, cited in Mieg, 2017, p. 25). Accordingly, the structure of the research colloquium and the sequencing of the assignments followed the general steps of the research (planning) process as identified in relevant reference works, such as Creswell's (2014) book about *Research Design* (and more recent editions), Paltridge and Phakiti's (2018) chapter about *Developing a Research Project*, and Woodrow's (2020) book about *Doing a Master's Dissertation in TESOL and Applied Linguistics* (see section 2.5 for details). Furthermore, based on the available literature (see section 2.6) and the author's prior experience with digital feedback methods, the digital feedback procedures were mapped to the different phases of the research planning process as follows (Figure 3; see Schluer, 2023b, p. 9, for a German-language version).

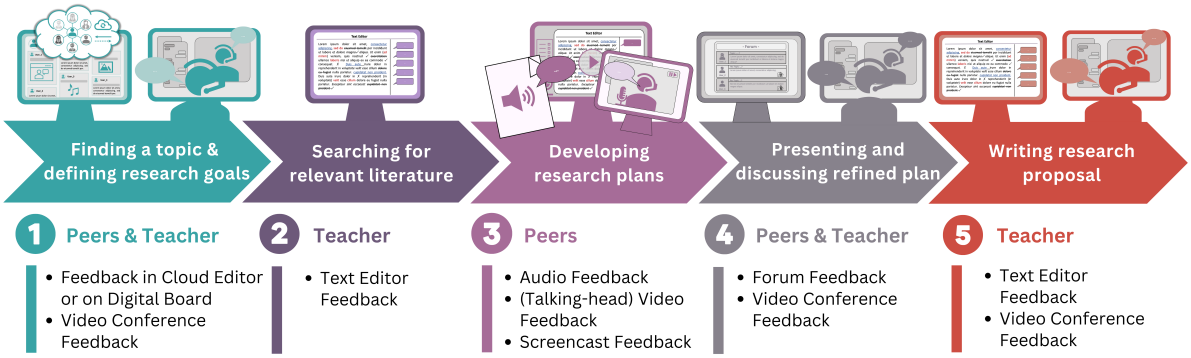


Figure 3: Digital Feedback at Different Stages of the Research Planning Process (see Schluer, 2023b, p. 9)

The process started with peer and teacher feedback on a digital board (usually Padlet) during the initial phase of topic search, then continued with teacher feedback in a text editor for the annotated bibliography that the students had written. Afterwards, the students developed their research plans and received recorded feedback as audio, video or screencast files from their peers. Based on the suggestions, they recorded their project presentations asynchronously and obtained feedback in an online forum before further discussions took place during the video conference or live meeting. Finally, they wrote a research proposal and received feedback from the supervisor. Generally, then, an inverted classroom approach (Lage et al., 2000) was adopted, with asynchronous feedback and learning taking place in preparation for a live meeting in which open questions were clarified, meanings negotiated and foundations laid for the next phase of the research planning process.

Following the recommendations by Hansen and Liu (2005, p. 32), Hedin (2012, p. 2) as well as Neumann and Kopcha (2019), teacher feedback was thus either given at separate phases or after the peer review activity was finished at the same stage. The procedures and their rationale are described in more detail below.

3.4.1. Topic Search and Development of Research Questions

Usually, the research and writing process starts with some brainstorming or idea generation (Coffin et al., 2003, p. 34). In the process of idea development, it is advisable to create an atmosphere in which students can exchange their ideas by asking Wh-questions and assessing the topic's relevance and feasibility, e.g. in light of the required resources and time investments (Hansen & Liu, 2005, p. 32). As suggested by Hansen and Liu (2005), peer feedback at the brainstorming stage "may help students decide which topic is more appropriate, and also generate more information" (p. 32). This can be achieved by inviting students to conduct mind-mapping individually or collaboratively (cf. Fatimah, 2018, p. 172). In that respect, digital boards like Padlet (or similar applications like TaskCards or Miro) could be suitable collaborative tools that allow for various types of comments and a flexible (re-)arrangement of contents (see also Gießler & Olejniczak, 2024, p. 138; see section 2.6.3). For students at more advanced stages, in turn, the utilization of a cloud editor, such as Google Docs, might be more fitting, as peers can directly comment on the shared draft (see section 2.6.2). Moreover, since these applications are commonly used in professional contexts, there is good reason to integrate them in education as well (Schmied, 2023, p. 10).

After the students had created their Padlet (or Google Docs), they exchanged the hyperlinks on the course cloud. Additionally, they introduced both themselves and their topics during a synchronous digital speed dating event. This was followed by an asynchronous "digital gallery walk", where peers commented on each other's cloud documents or digital boards. The majority of students used Padlet for their brainstorming, enabling them to give written feedback, attach hyperlinks to multimedia files, and rate ideas by clicking the "like" button.

Afterwards, the instructor provided feedback on each digital board or cloud document. In the next live meeting, the students had the opportunity to clarify open questions orally and to obtain additional feedback and suggestions. Next, the participants were asked to (re-)organize their ideas, for example by using mind-mapping or clustering techniques (Coffin et al., 2003, p. 34). This went along with the literature search task that was assigned next.

3.4.2. Review of Relevant Literature

To refine their research goals and research questions, the students conducted systematic literature searches in online databases and compiled an annotated bibliography in the required citation style. For the annotated bibliography, the students had to select about five publications that they considered particularly relevant for their thesis and to give reasons for their choices.

Identifying key resources and evaluating literature critically are central skills needed for composing the theoretical part of their thesis. Moreover, with this task, they learned how to cite and list sources in the required citation style. This is what they practiced on a small scale with approximately five key sources. They were also introduced to reference management software (such as Citavi and Zotero) and were encouraged to practice its utilization. The students then submitted the annotated bibliography to their subfolder on the course cloud within the open feedback environment. The teacher subsequently provided electronic feedback in written form via comment balloons and track changes (see Schluer, 2022a, pp. 68–77). Following this, the students were advised to perform additional searches to refine their research goals, including literature about research methodologies required for the subsequent step.

3.4.3. Methodology and Research Plan and Structure of Academic Paper

Based on their searches and the feedback, the students were requested to draft a research plan and a preliminary table of contents. For this, they obtained a pre-formatted template of a work plan and sample paper structures as well as handouts with information about research methods and tools. Outlining important parts of the thesis and phases of the research process are important steps to gain clarity about possible options and expectations at an early stage already. Certainly, the research procedures and structures of academic papers will vary, depending on the topic and methodology that is chosen (see e.g. Paltridge & Starfield, 2020, pp. 88–98). As feedback is essential at this stage, the students were again asked to upload their drafts (work plan and thesis structure) onto the course cloud.

This time, the students paired up in small “peer support groups” (Evans, 2013, p. 79; cf. the review by Neupane Bastola & Hu, 2023, p. 11; see also Woodrow, 2020, p. 6) consisting of about three students. Oral feedback, provided through voice or video messages, was deemed valuable for expressing a train of thoughts and evaluating higher-order aspects of an argument (cf. Elola & Oskoz, 2016, p. 71; see section 2.6.4). In contrast to live exchanges, recorded files can be played back several times, which is particularly useful for feedback on complex aspects, such as research plans or paper structures (cf. Schluer, 2022a, p. 162). The students were therefore introduced to the creation of digitally recorded feedback via audiocasts, videocasts or screencasts, and were free to choose the digital format they considered most suitable for the feedback provision. The peers then uploaded their recorded feedback onto the course cloud that was accessible to all colloquium members. After this asynchronous exchange of feedback, the peers had the chance to participate in live discussions within their small groups and in the plenary.

3.4.4. Presentation of Research Plan

Equipped with this feedback, the students were asked to prepare their proposal presentation as a screencast recording before a self-selected discussion date. In earlier years, the students

delivered a live presentation on the scheduled day, but due to the high number of participants and the commonly low amount of peer interactions after the presentation, the procedure was changed (see Schluer, submitted). Hence, the recorded presentations were made available at least two days before the meeting so that the fellow students and the teacher were able to watch them and take notes. The peers then contributed comments in each presenter's online forum (cf. section 2.6.5), which the student reviewed right before the session. The synchronous meeting can thus be seized for follow-up discussions and the clarification of open questions. Per session, three discussion slots were available, i.e. up to thirty minutes per person.

3.4.5. Written Research Proposal

Based on the feedback, the students were instructed to submit a written project proposal to the supervisor, together with a refined work plan. The supervisor then annotated the document with written feedback, following the steps described in Schluer (2022a, pp. 70–75). She applied a consistent color scheme for different comment types (Schluer, 2022a, p. 72) and addressed both lower-level and higher-level aspects. Lower-level corrections pertained to spelling, grammar, punctuation, and word choice (Elola & Oskoz, 2016). The process was expedited by the use of automated spelling and grammar checkers in the text editor (Schluer, 2022a, pp. 91, 233). Mainly, though, the focus was put on recurring errors, with hints for the students to self-correct. Furthermore, in terms of higher-order aspects, comments about the contents as well as suggestions for modifications were provided. The reviewed document was then returned to the student via the course cloud. With this, the thesis writers continued their work on their research and were able to re-consult during the supervisor's office hours or via email whenever needed.

3.5. Research Context and Population

The study took place at a German university in a course that concentrated on supporting students in the research planning process. Within the English department, the TESOL Research Colloquium (TRC) is attended by Master students in their third semester (or higher) as well as by PhD students and those who aspire to become doctoral students in the field of TESOL. Approximately 12 to 15 people attend this colloquium per year. In winter term 2022/23, a total of N=22 Master and doctoral students were registered, some of which intended to finish the course in a later semester or in a different field of research and therefore did not (regularly) participate.

Many of the TESOL students have an international background; only very few are students who had been linguistically, culturally and academically socialized in a German-speaking environment. In fact, they come from a number of countries, mostly from Eastern Europe, Asia and the Middle East, where they had grown up and passed their Bachelor's degree, sometimes already their first Master's degree. Since the contents of the preceding degree programs vary –

often considerably –, the students' background knowledge naturally differs as well. Moreover, the academic conventions and learning practices might be different from those of the institution they have entered for their (second) Master's degree (cf. the review by O'Neill & Petchko, 2023, p. 107). While the university strives to create similar entrance conditions through a language test and careful reviewing of the previously attended courses, the underlying theoretical conceptualizations, teaching and research approaches as well as specializations within the wide field of English Studies nevertheless fluctuate.

On top of that, the MA (Master of Arts) students' previous teaching experience is highly diverse. Some had already worked as a teacher in their home country for several years before they decided to pursue a Master's degree in Germany; some work as a teacher or tutor in parallel to their studies; a few others have no teaching experience at all; whereas most others had already gained a bit of teaching practice during their internship. Also, the language proficiency in English as a lingua franca as well as their cultural competence varies. Often, their experience in academic writing and research is limited, particularly since most longer papers are to be written towards the end of the third MA semester, i.e. after the research colloquium is completed. Beforehand, they typically had not composed a longer academic paper in the Master program, sometimes not even in their Bachelor studies.

Moreover, the participants find themselves at different stages of the research process. Usually, the TRC is attended in the third MA semester in preparation of the Master thesis. However, many students feel that this is too early, as they still need to pass several other courses in parallel before being allowed to register for the MA thesis. Therefore, some Master students choose to participate in their fifth or later semester. Sometimes, they already have concrete ideas in mind, whereas many others had never thought about their possible thesis topic beforehand. Still others had changed their topic and selectively attended a few TRC sessions again to clarify open questions, while some joined individual sessions to discuss the progress they have made with regard to data collection and analysis. Similarly, the (prospective) doctoral students find themselves at different research phases: Some have vague ideas about their topic, whereas others have already worked on a concrete topic for a longer period. Thus, the group of participants comprised:

- Master students in the field of TESOL in their third MA semester who complete the course according to the study regulations and must pass a preliminary examination (PVL). This PVL consisted of the presentation of their research project.
- Master students in the field of TESOL in higher semesters who voluntarily attend the seminar (and had already completed the PVL in the previous year) in order to discuss or revisit their research topic or to develop a new one (e.g., due to changed circumstances or interests).

- Prospective doctoral students who wish to pursue a doctorate in the field of TESOL at Chemnitz University of Technology (TUC). They were either already based in Germany (Chemnitz or another city) or (still) abroad.
- Registered doctoral students in the field of TESOL who were in the first or second year of their PhD at TUC and would like to discuss their research topic or develop specific aspects of their proposal (e.g., on research methodology).

For this heterogeneous group of participants, individual support is crucial, especially as they work on a variety of topics and implement different methodologies. Topics include, for example, intercultural communicative competence, English as a lingua franca and multilingualism, special needs education, sustainability education, technology-enhanced learning, including apps for different skill areas, artificial intelligence and social media, digital feedback, movie- and game-based learning, humor in foreign language teaching, analysis of ELT textbooks and curricula, videos or other multimedia contents, materials development and design-based research, etc.

Since the Covid-19 pandemic, most colloquium sessions were conducted online. This had two major reasons: first, exploiting the benefits of digital tools; second, enabling attendance by those who do not live in the same city, must be absent due to care work or other obligations (e.g. work), or join as external guests from abroad. Accordingly, the research colloquium also featured selected presentations by international scholars to give students insights into their research studies and obtain feedback from them. As Schmied (2023) explained,

> "A special advantage of modern international online teaching is to bring experts from various academic backgrounds into the virtual classroom, which would never have been possible in the traditional classroom, because it would be ineffective in terms of time and expenses" (p. 5).

The colloquium sessions took place once per week, spanning 90 minutes in each of the 15 lecture weeks. Most sessions were live meetings in videoconferences, in which the different steps and the feedback were discussed.

Data collection occurred in winter term 2022/23, i.e. from October 2022 till February 2023, through convenience sampling. Informed consent was obtained from N=14 participants, thereof N=9 Master's and N=5 (prospective) doctoral students. In addition to the completion of a consent form at the beginning of the course, participation in the online surveys likewise presupposed their agreement. Students were informed about the anonymization process and the confidential treatment of their data. In all assignments, the participants were required to utilize a student code consisting of the first three letters of their last name, the first three letters of their first name and the day of their birthday to facilitate the subsequent anonymization process. Immediately after the submission of an assignment, the code was transformed into an anonymous number to ensure the confidential handling of the data as well as objective analysis and

assessment (S001 etc.). In the feedback exchanges, though, students often used their real names, which had to be anonymized by replacing it with the randomly assigned number. This student number was then consistently used for all assignments and surveys that were completed by the same person to enable cross-references and comparisons between the different data sources. Details about the research approach and instruments will be provided next.

3.6. Research Approach

The present study is mainly based on a (social-)constructivist worldview as the philosophical orientation that guides the research process (Creswell, 2014, pp. 9–10; Creswell & Creswell, 2023, pp. 9–10). Participants' subjective viewpoints, meanings and actions thereby constitute the focus of interest. Through the peer learning approach (see section 2.3), their social construction of knowledge additionally becomes important. Moreover, the research has a partly transformative agenda insofar that the participants should be empowered to (proactively) utilize (digital) feedback or digital tools in their future career, notably as an English-language teacher. It is also driven by a pragmatic worldview through the quest for knowledge to better comprehend an underexplored topic (Creswell, 2014, pp. 10–11; Creswell & Creswell, 2023, pp. 11–12) and find solutions for existing problems students face.

To gain a deeper understanding of the object under investigation, a mixed methods design was employed. Mixed methods is the combination or integration of quantitative and/ or qualitative data collection and analytical procedures (Creswell & Creswell, 2023, p. 15). On the one hand, four online surveys were developed that consisted of closed as well as open questions to varying extents (cf. Kuckartz & Rädiker, 2019, p. 219; Woodrow, 2020, p. 79). On the other hand, students' feedback processes and products were documented and analyzed, mainly through qualitative content analysis but also through statistical measures. Each data source thus involved a mixture of quantitative and qualitative procedures.

Overall, the approach can be characterized as a multiphase mixed methods design (Creswell, 2014, pp. 16, 228). Information was collected concurrently from different sources in both qualitative and quantitative ways for each digital feedback method at a specific research phase. Moreover, data collection occurred sequentially along the different research phases as formative assessment and additionally through a summative evaluation (cf. Creswell, 2014, p. 231).

Per phase, a convergent parallel mixed methods design was applied, in which both qualitative and quantitative data were collected at (almost) the same time, not only through the same instrument but also through different data sources (Creswell, 2014, pp. 15, 219–223, 231; Creswell & Creswell, 2023, p. 235). This pertained to each of the three peer feedback phases of the TRC, i.e. cloud-based feedback on digital boards, digitally recorded feedback, and feedback in online forums. For each phase, students' feedback was gathered and analyzed in addition to the data from the corresponding online survey. Hence, the data from the different sources were compared and triangulated to obtain a richer picture about students' views and practices with

regard to a specific digital peer feedback method (cf. Creswell, 2014, pp. 219–220; Creswell & Creswell, 2023, p. 235). Afterwards, this procedure was repeated for the subsequent phase. Finally, a summative course evaluation survey was implemented to obtain an overall assessment of the TRC. In contrast to the preceding surveys that were mainly qualitative in nature, it contained a higher proportion of closed questions, but still a few open questions. Conversely, the analysis of the feedback documents and multimedia materials was mostly qualitative (cf. Creswell, 2014, p. 190; Creswell & Creswell, 2023, p. 202), given the dearth of prior studies.

Accordingly, the study was mainly exploratory, seeking to obtain new and rich insights into an under-researched field through a triangulation of the different pieces of evidence. Based on the initial exploration, it is planned to conduct confirmatory research in later TRC rounds (cf. Woodrow, 2020, p. 34). The instruments used will be presented next.

3.7. Research Instruments and Data Sources

To obtain answers to the four research questions, participants' responses to four online questionnaires (three formative and one summative) as well as their peer feedback were analyzed. These surveys can be accessed via the links shown in Table 1, either as a preview link showing the entire survey at once, or as the respondents' version that was disseminated to the TRC participants.

Table 1: Overview of TRC Surveys

TRC survey	Preview link	Responder's link
Survey 1: Biographical Info & Digital Boards	https://docs.google.com/forms/d/1bfHqdqvcKcXkESlSNDtHcp5uLxaNJ6GG27RhOj2lFwQ/prefill	https://forms.gle/9o4KHuQL1touE5QZ8
Survey 2: Recorded Feedback	https://docs.google.com/forms/d/1NNOe7u3kpc_Hi_nO8I5CTtBc8DYcce-ebHWcqWcTSm8/prefill	https://forms.gle/d6WuiPRCgXgvY32h6
Survey 3: Online Forums	https://docs.google.com/forms/d/1rPzMTrBFMT6xiP1O_qNk2nIdb_kH9G0ymhH3GWYxDAU/prefill	https://forms.gle/Hw5wHaFMcR8BbWsB9
Survey 4: Summative Course Evaluation	https://docs.google.com/forms/d/1BAQ_7QaqL_CsVErkEZKXNXOaZyallbXpTvCS4ra5CZk/prefill [note that the preview contains sections for all TESOL courses; however, only the TRC section was utilized for the current implementation]	https://forms.gle/JXKhoGAekDSwHqax5

The surveys had been piloted with a small number of students from the same population who participated in a preceding TRC. Moreover, the teaching approach was tested in 2021/22 (see Schluer, submitted), accompanied by reflective discussions with the participating students. This pre-testing turned out to be successful overall and led to some modifications to further

enhance students' engagement. Notably, it was decided to use an online forum for the feedback on the proposal presentations instead of the shared notes of the videoconference room. Furthermore, as the participants were at different stages of their research project, students utilized a broad range of digital tools, i.e. not only digital boards, but also cloud-editors and other collaborative tools, such as Google Docs and Google Slides. The first survey was therefore expanded to include questions about these various types of tools.

In the present study, the students were thus offered a range of options for step 1, followed by recorded feedback in step 2 and forum feedback in step 3. After each round of peer feedback, the participants were requested to complete an online survey in which they described their prior familiarity with the tool and assessed the usefulness of the feedback obtained. They were asked to give reasons for the evaluation and to specify the perceived advantages and disadvantages from their dual perspectives as feedback providers and recipients. Moreover, based on this reflection, they were encouraged to give suggestions for improvement. Altogether, there was one survey about cloud feedback (e.g. Padlet, Google Docs), one about recorded feedback (audio, talking-head video, screencast, or combination), and one about forum feedback (OPAL). In addition, the actual feedback was collected and analyzed along several dimensions. Many of these categories recurred across modes, but others (especially the subdimensions) varied due to unique modal affordances of the tools (see results chapter for details). Table 2 gives an overview of the main categories of analysis for the feedback products as well as a brief sketch of the survey contents (see Schluer, to appear, for a German-language version).

Table 2: Data Sources (DS) for the Digital Feedback Analysis

DS1: Feedback products	DS2: Online surveys
• Feedback contents • Feedback strategies • Feedback purposes • Linguistic strategies • Visual strategies • Further feedback interactions, follow-up actions, follow-up communication or cross-references	• Usefulness rating on five-point Likert scale ("1" not useful to "5" very useful) • Free-text responses: reasons, reflections on advantages and disadvantages about the digital feedback methods from students' perspectives as providers and recipients • Determination of similarities and differences between the three digital feedback methods in their specific contexts of application

The aim of this interactive-formative evaluation (cf. Balzer & Beywl, 2018, p. 68) was to encourage students to continuously reflect on the different digital feedback methods and their suitability. The results obtained can be used for the ongoing improvement of the course design.

In addition to the three formative online questionnaires, a final summative questionnaire was implemented that consisted of two parts. The first part was a "traditional course evaluation" with 17 statements about the learning process, instructor, media usage, organizational

aspects, as well as learning gain and satisfaction with the colloquium. It was hypothesized that for relevant dimensions, the ratings on the five-point Likert scales would be higher than in previous years (where the digital feedback design was not yet employed). Second, the survey contained a reflection section to gain supplementary insights into the evaluative judgments from the foregoing questionnaires. First, two open questions were posed about particularly successful or challenging aspects of the seminar as seen from the participants' point of view. This was followed by a section on the overall evaluation of the digital feedback methods used in the colloquium. It included three open-ended questions on the digital feedback methods that were perceived as particularly useful, on possible changes to the procedure and on further desiderata, as for instance future interests in the field of digital feedback.

The results can serve as legitimation for the revised course design (cf. Balzer & Beywl, 2018, p. 69), especially when improvements can be detected as compared to previous years. Moreover, the long-term anchoring of the digital feedback methods in the curricula (degree programs/ courses) was a secondary purpose (see Schluer, 2024i).

In the following tables, the data sources and instruments will be characterized before assumptions and hypotheses about their expected outcomes will be made in the subsequent section 3.8. First, Table 3 categorizes data source type 1 (DS1), i.e. the feedback products, along several dimensions.

Table 3: Characterization of Data Sources for Feedback Analyses (DS1)

Research Question	**RQ1**	**RQ2**	**RQ3**
Research Phase	topic identification	planning of methodology & drafting	proposal presentation
Feedback Method/ Format	digital boards	recorded feedback (self-selected format: audio, talking-head video, screencast or combination)	online forums
Application/ Tool	self-selected by participants		OPAL forum (integrated in LMS)
Creation	individual work		
Structure	chosen by participants within the scope of available tool features	chosen by participants within the scope of possibilities of the selected medium and tool	chosen by participants, but limited by forum features
Approach	peer feedback		
Feedback Direction	one-to-many feedback	within groups of approx. 3 students	one-to-many feedback
Mode	mainly written, with additional modes (e.g. audiovisual)	oral and/ or visual (highly dependent on chosen feedback format)	mainly written, with additional functions depending on forum

Research Question	RQ1	RQ2	RQ3
	depending on application		
Timing	mostly asynchronous	asynchronous	
Anonymity	possible, but not common	no	

Second, Table 4 provides an overview of the formative surveys serving as data source type 2 (DS2).

Table 4: Characterization of Data Sources for Survey Analyses (DS2)

Research Question	RQ1	RQ2	RQ3
Survey Focus	(peer) feedback on digital boards	recorded (peer) feedback	(peer) feedback in online forums
Medium	online questionnaire (administered via Google Forms)		
Participation	individual, via student code		
Timing	asynchronous		
Survey Sections	• students' previous knowledge and use of the medium/ tools (digital boards and cloud editors; recorded feedback; online forums): purpose/context, frequency, tools • reflection on the medium/ tools for feedback purposes: advantages and disadvantages from providers' and recipients' perspectives • assessment of usefulness of feedback received (rating and reasons)		
Question Types	• some closed questions (rating of familiarity and usefulness; for recorded feedback: about selected method) • mostly open questions (advantages and disadvantages as well as justifications for the closed questions)		

It hence becomes clear that all surveys followed a similar structure while containing a mixture of open and closed questions. The participation was not entirely anonymous as it relied on the use of a specific student code to make comparisons possible across the different surveys and to match the perceptions to the actual feedback products. By contrast, the participation in the final survey was anonymous, as stated in Table 5 (column on the right-hand side).

Table 5: Characterization of Data Sources for the Overall Course Evaluation (RQ4)

DS1: **Revised research outlines**	**DS2:** **Survey 4 as course evaluation**

• structure chosen by the participants themselves, but typically following the recommended templates issued by the supervisor (introduction, literature review, methodology, work plan)
• created individually
• written text (possibly illustrations)
• participation not anonymous
• no peer feedback, only teacher feedback
	• rating of 17 five-point Likert scale items (from "1" does not apply at all to "5" fully applies) pertaining to the five major evaluative dimensions, i.e.
	  • learning process (contents, structure, fellow students, methods)
	  • teacher
	  • media use
	  • organizational aspects (group size, requirements)
	  • learning gain and satisfaction with course
	• closed questions in the rating part, but mainly open questions in the reflective sections
	• online questionnaire, asynchronous, standardized (used in various courses)
	• anonymous participation
	• completed individually by the students

Based on these characteristics, assumptions and hypotheses about the expected results will be made in the next section.

3.8. Assumptions and Hypotheses

This section will present some preliminary assumptions and hypotheses regarding the expected outcomes related to the four research questions, which would demonstrate the efficiency of the suggested digital course design. In that respect, the two major data sources, i.e. the peer feedback products (DS1) and the formative/ summative surveys (DS2), will be considered. As the focus will be placed on peer feedback procedures, the analysis will omit the phase in which only the lecturer provided feedback on the preliminary literature review and finalized written proposal (see left column of Table 5).

The analysis of the digital peer feedback is expected to yield findings about the way students **exchange** feedback (part one of RQs 1–3), whereas the survey results can provide insights about their usefulness **evaluation** (part two of RQs 1–3 as well as RQ4). The assumptions and hypotheses are displayed in Table 6 to Table 9 for each RQ.

(1) How do students exchange and evaluate **digital peer feedback on digital boards** during the phase of topic identification and delimitation for their thesis?

Table 6: Assumptions and Hypotheses for the Analysis of Feedback on Digital Boards (RQ1)

DS1: Feedback products on digital boards	DS2: Survey 1 on digital board feedback
• Feedback contents: Feedback is provided on the topics and on issues identified on the author's digital board or document. • Feedback strategies: Feedback is specific, i.e. it relates to concrete aspects and includes explanations or further guidance. • Feedback intentions: The feedback purpose is motivation, inspiration, or correction. • Linguistic strategies: Feedback is worded in an understandable, clear and appreciative manner (linguistic politeness). • Visual strategies: Annotation tools are used purposefully (e.g. modality and sequencing). • Further feedback interactions: The authors respond to the comments, or there is follow-up interaction, or the authors create a refined draft of their research topic.	• The majority of participants rate the usefulness of the feedback received on the digital board at least with the score 3 on a five-point Likert scale (ranging from "1" not useful to "5" very useful). • In the free-text responses about the advantages and disadvantages of digital board feedback, the advantages outweigh the disadvantages overall. • The rationales for assessing the usefulness given by the participants provide further insights that can be triangulated with the actual feedback they received (Data source 1). • The introductory questions about prior experiences serve to identify possible hurdles or other potentially relevant factors.

(2) How do students exchange and evaluate **digitally recorded peer feedback (via audio, video, or screencast files)** during the phase of research planning and drafting?

Table 7: Assumptions and Hypotheses for the Analysis of Digitally Recorded Feedback (RQ2)

DS1: Digitally recorded feedback	DS2: Survey 2 on recorded feedback
• See above criteria for digital boards (DS1) • Additionally: References might be made to the preceding communication. • Additionally: The learning progress could be pointed out in relation to the previous submission.	• See criteria for digital boards (DS2) • Additional differentiation according to feedback formats (audio, video, screencast, or combination), possibly with differences in the perceived usefulness of the feedback methods. • Additionally: Comparison of results from the previous questionnaire possible.

(3) How do students exchange and evaluate **digital peer feedback in online forums** during the phase of their research proposal presentation?

Table 8: Assumptions and Hypotheses for the Analysis of Forum Feedback (RQ3)

DS1: Forum feedback	DS2: Survey 3 on forum feedback
• See above criteria for digitally recorded feedback (DS1) • Additionally: Comparison of previous feedback/ learning products possible.	• See criteria for digital boards (DS2) • Additionally: Comparison of results from the previous questionnaires possible.

(4) Overall, how do students assess their **learning gain** from the research colloquium?

Table 9: Assumptions and Hypotheses for the Overall Course Evaluation (RQ4)

DS1: Revised research outlines	DS2: Survey 4 about course evaluation
• Degree of detail in research planning: The research outlines show a coherent argumentation, which is theoretically sound, and which includes a work plan for the research project. • Reflection on research planning: The research outline may contain a section (or phrases/ sentences) in which the participants critically reflect on their research plans, possibly referring back to the feedback they received in the seminar.	• In the standardized part of the evaluation questionnaire, most participants assign a score of 3 or higher on a five-point Likert scale (from "1" does not apply at all to "5" fully applies) for the dimensions that are particularly relevant to the current course (learning gain, satisfaction, cooperative learning, self-regulated learning, media use, structure). • Compared to previous years, where the digital feedback design was not yet used, most mean scores and the overall mean are higher. • Furthermore, the reflective section provides complementary insights into the evaluations obtained from the previous questionnaires.

To gain insights into the actual results, the following analytical procedure was adopted.

3.9. Analytical Procedure

The survey responses and peer feedback were analyzed to assess the effectiveness and utility of digital feedback methods at different stages of the research process. Altogether, the sequencing of tasks, instruments and analytical procedures occurred as depicted in Figure 4.

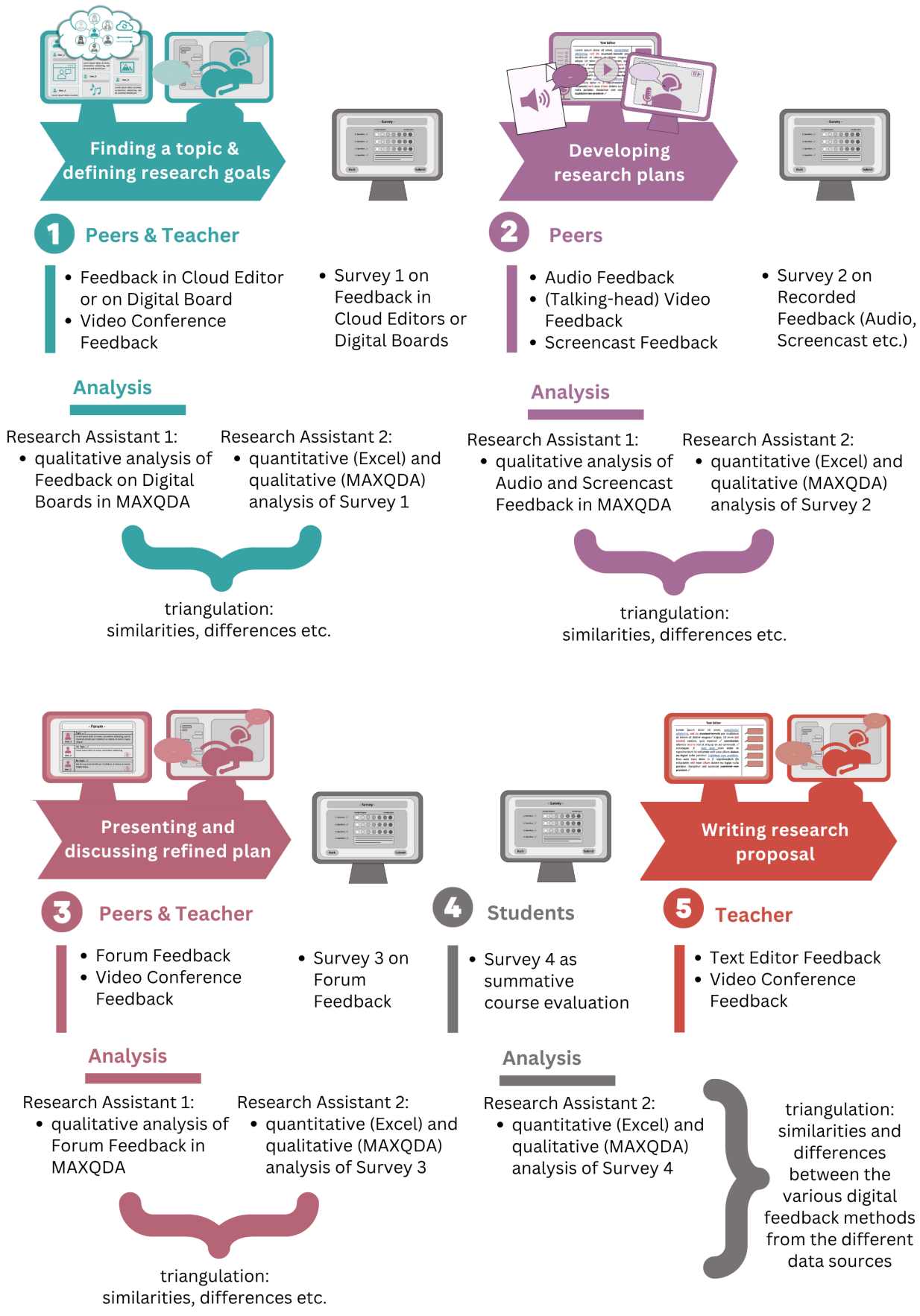


Figure 4: Overview of Instruments and Analytical Procedures in the TESOL Research Colloquium

As Figure 4 shows, the peers first produced feedback on digital boards or via another cloud-editing application and subsequently completed the first formative online survey. This survey 1 simultaneously collected biographical information from the participants. Afterwards, the students received feedback from the instructor via the same application, before follow-up discussions took place in a live session (videoconference). The synchronous feedback in the live meetings was, however, not collected and analyzed. Neither was the teacher feedback on students' annotated bibliographies part of the analytical design. Instead, only the peer feedback was examined, which is in line with the research aims. Next, the second data set was obtained from students' digitally recorded feedback in audio, video or screencast format, created within small peer support groups. It referred to their drafts of their research plan and their preliminary thesis structure. Again, students were asked to complete an online survey (survey 2) right after the feedback exchange. Thirdly, the peer feedback on students' multimodal proposal presentations was gathered via online forum entries. For this, the participants created a screen-recorded slideshow with voiceover and shared it with their fellow students two days before their scheduled live meeting. In the meantime, the peers wrote forum entries, and usually the presenters already had the chance to read the contributions before their live discussion session took place. The students were requested to answer online survey 3 soon afterwards. At course end, i.e. in early February 2023, the students were asked to fill in the summative course evaluation survey (step 4 in Figure 4). Eventually, the seminar closed with information about the written research proposal that was due a month later (step 5).

The questionnaire responses were analyzed by means of descriptive statistics (closed questions) and qualitative content analysis (open questions). The formative surveys centered on the experiences and views of the participants with regard to the digital feedback methods. The closed questions were analyzed in Microsoft Excel, whereas the open questions were coded in the software program MAXQDA (VERBI Software, 2021; for details see section 3.10). As for the summative survey, statistical analyses (mean values, standard deviations, etc.) were performed on the ratings for the 17 five-point Likert-scale items. Moreover, t-tests were conducted to determine statistical significances compared to previous implementations.

For the feedback products, a qualitative content analysis was carried out (Kuckartz & Rädiker, 2019). They were analyzed in terms of feedback content, feedback strategies and feedback purpose, as well as the linguistic and visual strategies that were employed. Moreover, further potential interactions, such as follow-up feedback exchanges or cross-references to earlier communication, were investigated (see left column in Table 2). These analytical categories were created both deductively (based on the research questions and prior experiences) and inductively (data-based) (see Gibbs, 2007, pp. 44–45), with the focus placed on the latter. In line with the principle of openness in exploratory research, the coding consisted of several iterative cycles (see e.g. Jacques, 2021, p. 24; Rädiker & Kuckartz, 2020, p. 15) conducted by the project head (author of this article) and a research assistant. Discrepancies in coding were

resolved consensually through discussion. Further details will be explained in the next section 3.10.

3.10. Coding of Open Responses and Feedback Products

For the open responses in the online surveys as well as for the feedback, a qualitative content analysis was carried out. Qualitative content analysis aims at analyzing textual, visual or multimodal data in context through condensation, classification or explication in order to gain a better or deeper understanding about the phenomenon that is investigated (cf. the review by Schluer, 2017, p. 315; see e.g. Mayring, 2010, pp. 60–62, 65; 2014). It follows a rule-governed and thus more systematic procedure than several other types of qualitative analysis (cf. Flick, 2009, p. 222). Accordingly, Schreier (2012) defined qualitative content analysis as "a method for describing the meaning of qualitative material in a systematic way" (p. 1). It can be combined with quantitative analyses (Krippendorff, 2013, p. 88), such as frequency distributions, to determine similarities, differences and tendencies in the data sets. To create greater transparency, the next subsections will provide more information about the data preparation (section 3.10.1) and the coding process (section 3.10.2).

3.10.1. Data Preparation and Software Program

The analytical process in qualitative research is nowadays usually assisted by specialized software programs, such as NVivo, MAXQDA or ATLAS.ti (see e.g. Krippendorff, 2013, ch. 12; Schreier, 2012, ch. 12). In the present study, each data file was uploaded into MAXQDA 2022 (VERBI Software, 2021) after its anonymization (see e.g. Kuckartz & Rädiker, 2019, on using MAXQDA for analyzing, textual, visual and multimodal data). Per data source and peer review phase, a separate MAXQDA project was created. Hence, there was one MAXQDA project for all open responses in survey 1, one for survey 2, one for survey 3, and one for the course evaluation survey. Furthermore, there was one MAXQDA file for the feedback products in phase 1 (cloud-editor feedback), one for phase 2 (recorded feedback), and one for phase 3 (forum feedback).

While the forum entries were uploaded as PDF files containing textual data, the feedback from the other two phases consisted of two different formats. For the first round of peer feedback, it comprised pictures created from screenshots of the digital boards as well as PDF files containing a chronological sequencing of the feedback texts. For the recorded audio and screencast feedback, the contents were transcribed and linked to the original recordings in MAXQDA 22 (VERBI Software, 2021). This procedure allowed for easier navigation and lexical searches in the files (Kuckartz & Rädiker, 2019, p. 84). Following the steps taken by Schluer (2021b; 2022b) in her screencast feedback project, the transcription not only comprised verbal details, but also paraverbal information (audio and screencast feedback) as well as screen actions (in the screencasts). Para- and non-verbal information was put into double parentheses, e.g. ((giggles)) or ((circles word with cursor)). Underlining was utilized for a strong emphasis

of words, word parts or expressions. Pauses were indicated by two dots [..] for short durations and three dots […] for longer breaks. The number of dots did not reflect an absolute but a relative duration, depending on the normal flow of the feedback providers' speech. "Erms" were transcribed as well, while hyphens were used to characterize self-repairs, new starts, or reformulations, such as "I think it would be best– better to …". Incomprehensible words and passages were marked by the word ((unintelligible)), and likely meanings were directly written in parentheses followed by a question mark, e.g. "It's a (thorough?) analysis". Errors were signaled by the word [sic] directly after their occurrences and additionally colored in red font. Time stamps were inserted regularly and linked to the recordings for easier reference (cf. Kuckartz & Rädiker, 2019, p. 47).

3.10.2. Coding Process and Creation of Category Systems

Due to the scarcity of similar prior work, the category systems were mainly created inductively (cf. e.g. Gibbs, 2007, p. 45) from the contents of the open responses and the peer feedback, respectively. However, deriving from the review of published literature, it was possible to identify several preliminary categories to obtain an initial orientation. Nevertheless, the coding remained open to changes, including deletions, additions and re-categorizations, based on the actual data (Gibbs, 2007, p. 45). The coding process was thus mostly data-driven (inductive) rather than concept-driven (deductive) (Gibbs, 2007, pp. 44–45).

'Coding' is the process and product of "indexing or categorizing the text" (Gibbs, 2007, p. 38) by applying inductively or deductively created codes, i.e. category names. The process leads to coded segments (Kuckartz & Rädiker, 2019, p. 67) that represent coding units. A 'coding unit' was as long as necessary for capturing the categorized sense or phenomenon, but not longer than necessary (cf. Mayring, 2010, p. 59). This could be a single word or phrase (e.g. for hedges or pronouns), a sentence part or an entire utterance (e.g. a question), but usually maximally a paragraph that represents a unit of meaning (cf. e.g. Rädiker & Kuckartz, 2020, p. 15). Since the analyses were multi-layered, however, one text segment might also address several different categories (cf. Morton et al., 2014, p. A29).

The analysis of **open-ended survey responses** followed the recommended procedure of analyzing each question individually (Kuckartz & Rädiker, 2019, p. 226). Accordingly, all data pertaining to one question were coded first before the researchers moved on to the second question. For the advantages and disadvantages elicited in the surveys, the researchers' (Schluer & Gao) background knowledge of prior studies served as a foundation for a partly deductive coding (see Schluer, 2022a). In particular, Schluer's empirical project on peer screencast feedback adopted a similar approach, as students were asked to reflect on the benefits and challenges associated with screencasting during feedback provision and feedback reception, respectively (see Schluer, 2022b, pp. 24–25). Moreover, recipients were requested to evaluate the usefulness of the digital peer feedback and provide reasons for it (Schluer, 2022b,

p. 25). In addition to those formative surveys, the participants also completed a summative course evaluation questionnaire (Schluer, 2022b, pp. 25–26). Hence, it was possible to draw on previous coding experiences and categories, but only to a limited extent, since the assignment type, purpose and digital methods differed in the current research.

Likewise, for the **analysis of the recorded feedback**, the researchers (Schluer & Bleyl) had gained prior experience with the multimodal coding of screencasts, which thus led to the preliminary creation of a category system (see Schluer, 2021b; 2022b; for details on the required modifications, see the results section 4.8). More precisely, the following main categories had been established in the foregoing peer screencast study (cf. Schluer, 2021b, p. 164; 2022b, p. 27):

(1) Feedback structure: Sequential composition of the overall feedback message;
(2) Feedback valence and strategies: Specific or non-specific positive or negative feedback, with specific feedback including corrections, explanations and/or recommendations;
(3) Assessment criteria: Feedback objects, e.g. addressing aspects of form, language and/or the contents of the reviewed assignment;
(4) Visual strategies: Screen actions, such as highlighting, coloring or inserting arrows, boxes or other forms, to direct recipients' attention, but also demonstrations and inclusion of external elements to heighten the clarity of the explanations and suggestions;
(5) Auditory strategies: Oral emphasis or auditory signals used to direct recipients' attention;
(6) Critical evaluation: Quality assessment, e.g. errors in the feedback, possible over- or underuse of visual elements, audio quality, (lacking) synchronization of oral and visual information (as evaluated by the researcher, but also in relation to the recipients' survey responses).

Since several categories appeared to be peculiar to screencasting, notably with regard to the visual strategies and their synchronization with oral information, they might not be applicable to other digital feedback formats. Moreover, the pedagogical design differed in the two studies. In the peer screencast study (Schluer, 2020b; 2021b; 2022b), each student only created one feedback file for an anonymous peer who had submitted a draft of an academic paper. By contrast, the commenting was not anonymous in the current research, i.e. the feedback providers knew the recipients, which might have implications for the interpersonal dimension and the way language is used. Moreover, the students engaged in multiple rounds of peer feedback via different technologies. Hence, they might have referred to earlier communication or to conversations that took place outside of the classroom's formal learning environment. Due to the multi-staged assignments that differed in their characteristics and purposes (e.g. brainstorming, research planning, presenting), the contents of the feedback messages were likely to vary as well.

The main categories were therefore modified preliminarily for the analysis of the digital peer feedback products in the present studies, as shown in Table 10.

Table 10: Preliminary Categories for Coding

Category	Description
01_Feedback contents	Object or assessment dimension on which feedback is provided (e.g. topic choice, language use)
02_Feedback valence/ strategies	Positive comments or criticism, e.g. outlining strengths and errors/ areas for improvement (with varying degrees of detail, such as explanations and recommendations)
03_Feedback purposes	The function or likely intention pursued by giving feedback (e.g. to motivate, correct or inspire)
04_Linguistic strategies	Feedback provider's language use or linguistic strategies (e.g. utilization of hedges/ boosters, pronouns, sentence types)
05_Visual strategies	Visual strategy to attract or direct attention (e.g. highlighting, coloring, use of bold print or cursor movements)
06_Further feedback interactions	Recipient's reply to the feedback, cross-references to earlier conversations or other feedback exchanges

Especially for categories (1) and (2), it was important to determine feedback sequences or segments (Huisman et al., 2018, p. 960), also called feedback points (Hyland, 1998, p. 261, cited in Neupane Bastola, 2021, p. 568; F. Hyland & Hyland, 2001, p. 190), feedback aspects (van den Berg et al., 2006, p. 142), or feedback units. These are stretches of texts that deal with a particular aspect of the submitted assignment to which feedback is given (Huisman et al., 2018, p. 960). The length of such an "idea unit" can vary (Nelson & Schunn, 2009), ranging "from a few words to several sentences" (Gao & Chen, 2025, p. 29). Content-wise (category 1), it could address grammar issues, argumentation, citation or word choice, for instance (cf. e.g. the main distinction between aspects of content, structure, and style by van den Berg et al., 2006, p. 142, but also the review of prior research on feedback in thesis supervision in section 2.4). It was also presumed that the focus of the feedback might vary from assignment to assignment, given the highly individual nature of students' research projects and stages. Structurally (category 2), a conventional classification was adopted, i.e. comments can instantiate positive or negative feedback, possibly containing a description or specification as well as an explanation and suggestion for improvement (cf. e.g. Nelson & Schunn, 2009, pp. 386, 397–399; Wu & Schunn, 2021, pp. 367–368; see also section 2.3.3).

The feedback intentions (3), in turn, had to be inferred from the contents and language of the feedback. Feedback can, for example, serve corrective purposes, motivate the peers and/ or encourage reflections and revisions (cf. section 2.4.5). Additionally, one comment can fulfil several functions at once so that more than one subcode can be applied (cf. Kumar & Stracke,

2007, p. 464, and Xu, 2017, p. 244, in section 2.4.5). Since the general categories employed in prior research (referential, directive, expressive; Kumar & Stracke, 2007) are broad in nature, it was decided to directly code their subcategories whenever applicable, i.e. corrective, reflective, motivational etc.

The linguistic analysis (category 4) focused on the use of personal pronouns, hedges and boosters, as well as sentence types (cf. e.g. Nurmukhamedov & Kim, 2010; see section 2.4.7). In the current research, statements were not coded explicitly, but considered as the default sentence type. Questions, imperatives or exclamations, in turn, were coded as such (cf. Laflen, 2023, p. 9). As K. Hyland and Hyland (2006) remarked, the language used conveys information about interpersonal aspects (cited in Morton et al., 2014, p. A29). Notably, "hedges and questions can mitigate the potential criticism that feedback comments may convey" (Morton et al., 2014, p. A29). On the other hand, boosters can reinforce the pragmatic force, e.g. when assessors outline the strengths of an assignment or the necessity of a correction. Generally, in prior research, hedges and boosters have been considered as two complementary strategies for "expressing uncertainty and certainty" towards a particular content (J. Wang & Jiang, 2018, p. 197; cf. K. Hyland, 1998, p. 373) as well as for establishing or managing relations to readers and interlocutors, respectively (K. Hyland, 2005, p. 176). However, the terminology varies widely, especially as regards possible subcategories (Gribanova & Gaidukova, 2019, p. 87). Most categorizations were either based on linguistic form (P. Brown & Levinson, 1978; K. Hyland, 1998; Salager-Meyer, 1995) or pragmatic purpose (e.g. K. Hyland, 2001; Prince et al., 1982). It was found that some expressions might even serve as hedges or boosters, depending on the context of use (Holmes, 1984, pp. 359, 363; Thomson, 2018, p. 53). For instance, *quite* may attenuate or strengthen pragmatic force, as in *quite low* (hedge) and *quite remarkable* (K. Hyland, 1996a, p. 94) or *quite impressive* (booster). Therefore, it is crucial to conduct fine-grained qualitative analyses of the linguistic expressions in their specific contexts of use (cf. Markkanen & Schröder, 1997, p. 12; Mauranen, 1997, p. 119; Nikula, 1997, pp. 191–192; Salager-Meyer, 2000, p. 180). In the present research, it might make a difference as to whether they occur in positive or negative feedback (category 2), which could also have an impact on their interpretation as far as the presumed purpose (category 3) is concerned.

Category (5) becomes especially relevant in visual and multimodal feedback. Obviously, this comprises screencast feedback (see prior work by Schluer, 2021b; 2022b); however, many digital board applications likewise enable the utilization of visual strategies, such as coloring, arrows, emojis or other icons, pictures as well as embedded or hyperlinked videos (see section 2.6.3). Furthermore, texts could contain typographical particularities, including coloring or highlighting. The extent to which texts (e.g. in forums or on digital boards) can be enriched by visual strategies, however, depends on the features a particular tool offers as well as students' knowledge about these functions and skills in their use.

Finally, the follow-up interactions captured by category (6) can be indicative of the level of interactivity, as observable through students' responses to feedback, cross-references to earlier conversations or feedback exchanges conducted in different formats. Given the dearth of relevant prior research on multi-staged peer feedback, the coding of this main category was largely data-driven.

Likewise, the subcategories of each main dimension were primarily created inductively from the data. The coding of the material sometimes prompted additional literature searches (e.g. about subtypes of hedges and boosters) as well as structural modifications in the category system. Notably, the discovery of linguistic particularities in the feedback data resulted in targeted searches, for instance about adaptors as a type of approximator and hence as a subcategory of hedges (Fraser, 2010, p. 19), or about the utilization of "we" as an inclusive or collective pronoun expressing the peer perspective (cf. K. Hyland, 2001, p. 559). The detection of these features and the perusal of relevant literature resulted in continuous adaptations and a cyclical coding of the data. To keep track of the changes and peculiarities, several tools of the analytical program were exploited, including colors, memos and the logbook, as will be explained in the next paragraphs.

In the code system, colors were used purposefully to mark different categories that might prove useful for applying the visual tools in MAXQDA (VERBI Software, 2021). For instance, the main categories received different colors, sometimes also the subcategories, i.e. whenever fine-tuned differentiations appeared crucial. The auto-code function was hardly ever utilized, usually only for the coding of personal pronouns in the feedback products. Anyways, it had to be additionally checked manually to sort out erroneous codings (cf. Kuckartz & Rädiker, 2019, pp. 79–80).

Different types of memos (see e.g. Kuckartz & Rädiker, 2019, p. 54) were inserted into the MAXQDA file next to noteworthy or unclear passages as well as to identify novel codes or controversial codings, and to suggest code definitions (for the latter see Kuckartz & Rädiker, 2019, pp. 98–99). Regular (mostly weekly) meetings of the researchers helped to discuss the codings, analyses and interpretations in depth and to resolve potential intercoder disagreements (cf. e.g. Neupane Bastola, 2021, p. 568; Wu & Schunn, 2021, p. 373). This also affected the structure of the category system, notably the delimitation of subcodes for a particular construct.

To ensure consistency, the two coders regularly checked each other's coded segments. Additionally, a final consistency check was applied for the single codes (i.e. do all coded passages address the phenomenon captured by the code name?). Subsequently, different analytical functions of MAXQDA were applied, as can be seen from the results chapter 4. One common tool was the "Code Matrix Browser", which shows the frequency of particular categories across all documents or within a selection of files (Kuckartz & Rädiker, 2019, p. 157; Santos et al., 2021, p. 44). Moreover, the "Code Relations Browser" visually represents "the frequency of overlapping codes and aids in the identification of patterns and relationships in the data" (Jacques,

2021, p. 28). Furthermore, the “Complex Coding Query” allowed for the search of segments that were coded with two or more criteria (Jacques, 2021, p. 30; Kuckartz & Rädiker, 2019, pp. 112, 162). In that respect, different types of code co-occurrences could be investigated, e.g. whether codes for a segment were overlapping entirely or intersecting only partially or appearing after each other (Kuckartz & Rädiker, 2019, pp. 112, 160–163). Additionally, lexical searches enabled the localization of specific key words across all documents (cf. Jacques, 2021, p. 24; Kuckartz & Rädiker, 2019, p. 55).

Several of these tools are useful for performing descriptive statistics, since frequencies are directly provided. Beyond that, the statistics tool of MAXQDA enables further calculations, such as information about mean values and standard deviations (Kuckartz & Rädiker, 2019, p. 133), as well as t-tests to determine statistical significance as part of inferential statistics (Woodrow, 2020, p. 43).

Throughout, a logbook (Kuckartz & Rädiker, 2019, p. 285) and manual of analytical steps were created collaboratively by the two researchers (Schluer & Bleyl) for reasons of transparency and possible re-utilization. This type of documentation is also important to heighten the reliability of the research, as will be elaborated in the next section.

3.11. Considerations Concerning Validity and Reliability

Due to the mixed-methods design, considerations about both quantitative and qualitative validity and reliability need to be made. For qualitative research in particular, the role of and influence by the researcher on the validity and reliability of the research must be considered carefully (Woodrow, 2020, p. 46), which will be focused on in the next sections.

3.11.1. Reliability

Reliability refers to the consistency and thus replicability of a measurement, meaning that the same results would be obtained upon repeated measurement if the conditions were held stable Friedrichs, 1980, p. 102; Gibbs, 2007, p. 91; Mentz & Botha, 2012, p. 80, referring to Key, 1997). For instance, for quantitative research, a clear operationalization of variables is important for questionnaire design to ensure internal reliability (Woodrow, 2020, p. 47). External reliability, in turn, means that the questions lead to similar results when the study is replicated (Woodrow, 2020, p. 47). In qualitative research, this consistency can be enhanced by writing a precise and reflexive documentation, involving additional researchers and implementing continuous control mechanisms, as will be further explained below (see also Schluer, 2017, pp. 511–519).

First, the transparency and replicability and thus the reliability in qualitative research can be increased by writing a detailed and reflexive account of the context and study design as well as the processes of data collection, analysis and interpretation (cf. e.g. Flick, 2007, pp. 16, 138; Rath, 2025, p. 4). The documentation of the current study not only comprised the present monograph, but also several further documents, such as the lesson plans and minutes of the

individual course sessions, the student assignments, the transcription guidelines of the recorded feedback, the logbook and coding manual, as well as the notes taken during and after the research meetings. Continuous discussions with the students and co-researchers as well as personal reflections allowed for modifications as part of an emergent design and iterative research process (cf. Creswell, 2014, p. 186). Moreover, they helped to reduce personal biases based on individual researchers' intentions, beliefs, assumptions, knowledge and preferences (Creswell, 2014, pp. 20–21, 18, 186–189, 202; Gibbs, 2007, p. 91). Furthermore, the use of direct quotes from the data aids in making the research more transparent (Gibbs, 2007, p. 97).

Second, the involvement of other researchers when planning the research, searching for relevant literature and methodologies, creating drafts of assignments and data collection instruments, as well as analyzing and interpreting the data contributes to a higher reliability (Mayring, 2010, pp. 51–52, 117). This was achieved by involving two additional researchers in those phases.

Third, and related to the previous two aspects, continuous controls involved a regular review of the procedures, analyses, and interpretations (Gibbs, 2007, pp. 98–99; Steigleder, 2008, p. 189). For instance, the accuracy of the transcripts and codings was checked repeatedly (cf. Jacques, 2021, pp. 24–25}) and constructs were inspected for internal consistency (cf. Gibbs, 2007, p. 96). This links up to the other quality dimension, i.e. validity.

3.11.2. Validity

Validity refers to the extent to which research accurately measures what it intends to measure (Friedrichs, 1980, p. 100; Gibbs, 2007, pp. 91, 104; Mentz & Botha, 2012, p. 80; Woodrow, 2020, p. 46). Internal validity involves eliminating confounding variables or alternative explanations, while external validity relates to the generalizability of the results beyond the specific study context (Flick, 2007, p. 144; Gibbs, 2007, pp. 91, 104). Internal validity thus leads to similar results even though different researchers analyze the data (Woodrow, 2020, p. 47). There are several subtypes and considerations to be made, as will be explained next.

As regards sampling validity, the sample should accurately represent the studied population (Krippendorff, 2013, p. 335). The convenience sample of the current study (see section 4.2) appeared to be typical of the population at the selected university, as it was characterized by a high level of internal heterogeneity. Based on the researchers' experience of teaching at other universities, the participants of research colloquia at other higher education institutions and in other subject fields might be more homogeneous and/ or demonstrate different biographical variation.

Construct validity refers to the validity of the concept being studied (Flick, 2009, p. 267; Mayring, 2010, p. 117). It can be enhanced by explicitly defining the construct and its dimensions, as was attempted in the present study. However, due to the lack of relevant prior research, follow-up studies would be valuable to confirm or modify the construct definitions.

Furthermore, semantic validity denotes the extent to which analytical categories reflect the meanings texts hold for specific readers or within particular contexts (Krippendorff, 2013, pp. 338–339). Ensuring semantic validity in qualitative content analysis typically involves defining categories, providing anchor examples and coding rules (see Mayring, 2010). For this purpose, the memo function of MAXQDA was utilized. Moreover, semantic validity can be increased by continuously comparing the text passages that were assigned to particular codes (cf. Mayring, 2010, p. 119), as was done in the current project.

Communicative validation through member checking involves verifying interpretations with the participants (Creswell, 2014, pp. 201–202; Flick, 2007, p. 16; 2009, pp. 271–272; Kuckartz, 2018, p. 218; Mayring, 2010, p. 120). Conducting follow-up interviews with the students (Creswell, 2014, p. 202) could be a possible avenue for future research, but was not pursued in the present study. Instead, the participants' perceptions were elicited via four online surveys and through discussions in the live sessions. Moreover, they were triangulated against the analysis of the feedback products, which constitutes another measure to enhance the validity of the research.

Triangulation is the consideration of multiple perspectives (Creswell, 2014, p. 201; Flick, 2007, p. 40; 2009, p. 225; Gibbs, 2007, p. 94), such as of theories, methods, data sources, and investigators (Denzin, 1970, p. 300). By employing different approaches and sources, the biases of single methods or perspectives can be reduced (Denzin, 1970, p. 300; Flick, 2007, p. 41). In the present work, feedback was analyzed from multiple theoretical perspectives, based on different data sources and via quantitative and qualitative methods as well as by three researchers. Several measures were thus taken to ensure a high degree of validity and reliability. Beyond that, further suggestions for enhancing the quality of the research will be provided in the discussion chapter 5. Beforehand, the findings from the current study will be presented.

4. Findings

In this section, the results from the surveys and peer feedback analyses will be presented in response to the research questions that were posed. The chapter will start by describing the data corpus and participant sample (sections 4.1 and 4.2). Next, sections and 4.3, 4.4 and 4.5 will detail the findings from the three formative surveys before a brief intermediate summary will be offered in section 4.6. Subsequently, attention will be shifted to the extensive analyses of the feedback products. In that regard, sections 4.7, 4.8 and 4.9 will depict the results from the peer feedback analyses on digital boards, in recorded files, and in online forum entries, respectively. Afterwards, section 4.10 will synthesize the findings from the feedback analyses by comparing the three digital formats. The remaining two sections 4.11 and 4.12, in turn, will focus on the results from the summative course evaluation survey and contrast it with previous years when the current pedagogical design had not yet been applied.

4.1. Data Corpus

Table 11 gives an overview of the data corpus before the single elements will be considered in more detail.

Table 11: Overview of Data Corpus (TRC 2022/23)

<table>
<tr><th></th><th>Cloud Feedback</th><th>Recorded Feedback</th><th>Forum Feedback</th></tr>
<tr><td>Feedback Products</td><td>• 14 participants
• 14 boards
• 134 text comments
• 37 author responses
• 4 replies to author's response</td><td>• 12 participants
• 27 recordings
• 16 audiocasts
• 11 screencasts
• 2 author responses (audiocasts)</td><td>• 14 participants
• 10 forums
• 62 forum entries
• 1 announcement
• 9 author responses</td></tr>
<tr><td rowspan="2">Formative Online Surveys</td><td>• 14 participants
• Biographical information</td><td>• 13 participants, but thereof 1 incomplete</td><td>• 13 participants, but 1 response missing for disadvantages</td></tr>
<tr><td>• Familiarity with cloud applications
• Reflection on advantages and limitations & recommendations
• Assessment of usefulness of peer feedback</td><td>• Familiarity with recorded feedback
• Reflection on advantages and limitations & recommendations
• Assessment of usefulness of peer feedback</td><td>• Familiarity with online forums
• Reflection on advantages and limitations & recommendations
• Assessment of usefulness of peer feedback</td></tr>
<tr><td rowspan="3">Summative Evaluation</td><td colspan="3">• 13 participants, but thereof 1 incomplete</td></tr>
<tr><td colspan="3">• 17 statements with five-point Likert scales
• Two open questions (what was liked most, what could be improved)</td></tr>
<tr><td colspan="3">• Reflection on digital feedback methods in the seminar
• Reflection on potential changes and future needs</td></tr>
</table>

The following nine students participated in all activities: S003, S004, S005, S006, S007, S008, S011, S012, S013. Additionally, S001, S002 and S014 engaged with cloud and recorded feedback, but not forum feedback since they had either presented on an earlier occasion already (S001) or planned to do so in the next semester (S002 and S014). Conversely, S016 joined later and only received forum feedback. S009 skipped the recorded feedback activity and thus only participated in cloud and forum feedback. Moreover, S010 and S017 dropped early and only engaged in the first activity. Finally, S015 was a postdoctoral researcher who created a Padlet and gave a live presentation, but merely provided oral comments in the synchronous meetings, no asynchronous feedback. This explains the varying numbers of participants in the different activities and surveys, which will be acknowledged in the analyses.

4.2. Background Information about the Participants

Apart from inquiring into students' familiarity with and perceptions of cloud applications, survey 1 also collected biographical information. Altogether, N=14 respondents completed the survey, but one participant (S010) dropped towards a later stage of the seminar and therefore did not participate in all activities. Depending on their availability (especially due to sickness in winter term), the active engagement by other students was occasionally impeded as well. Hence, for subsequent assignments, sometimes only 12 or 13 persons finished the tasks (see Table 11). Since each data set (e.g. cloud feedback, survey 1 etc.) was immediately analyzed upon completion by the students, it was impossible to foresee potential later dropouts. Consequently, the number of participants varied slightly in the remaining activities, which was considered in the calculation of percentages. However, due to the processual nature of task completion and instant analysis, the late dropouts were not removed from the initial dataset.

In the TRC, all participants were students of English and American Studies with a specialization in TESOL. Nine were Master students (four 3rd semester students: S006, S007, S011, S013; two 5th semester students: S009, S012; two 7th semester students: S005, S008; one 9th semester student: S010), two were PhD students (one 3rd semester PhD: S001; one 1st semester PhD: S004), and three were potential PhD candidates who were preparing their PhD proposals (S002, S003, S014). Considering the drop-out by S010, the participants in later activities thus comprised N=8 MA students and N=5 (prospective) PhD students[4].

Of the N=14 initial participants, eleven were female (79%), three were male (21%), none were diverse. They came from nine different countries, including four from Turkey, two from Syria, two from Germany, one from Algeria, one from China, one from Georgia, one from Iran,

[4] The five participating (prospective) PhD students do not equal the five PhD students that are officially registered as PhD students in the TESOL section at TU Chemnitz at the time of writing this book. Some of them did not take part in winter term 2022/23, while other TRC participants were eventually not accepted as PhD students.

one from Lebanon, and one from Palestine (see Figure 5). The respondents confirmed that these also were the countries in which they had lived most of the time. As far as their university education is concerned, there only was a slight variation, with one participant (S004) stating that she had spent her studies equally in Turkey and Germany.

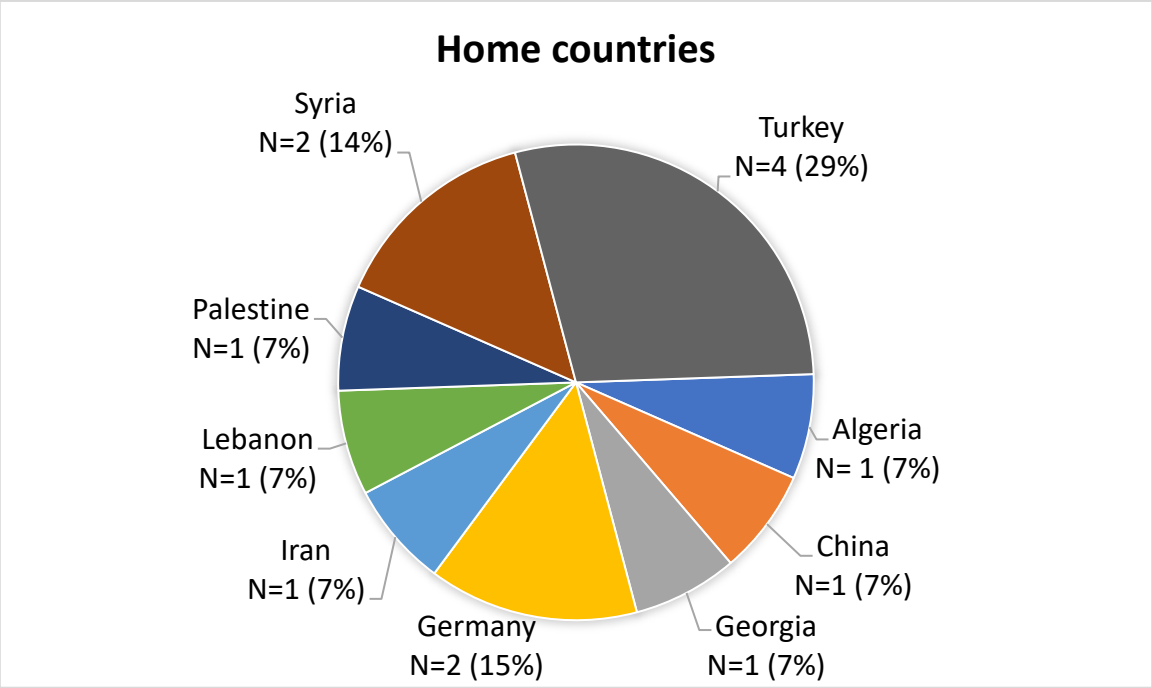


Figure 5: Home Countries of the TRC Participants (N=14)

Eleven respondents had been abroad for more than six weeks (79%), while three (S003, S008, S009) had not (21%). This seems easy to explain, since most of the respondents were international students studying in Germany. The participants also mentioned other countries, but for shorter periods of time (not more than a year), and the reason was mostly tourism or semester abroad.

The majority of participants (13 out of 14) felt that the language they were most comfortable using was their native language, with seven participants feeling comfortable in both their native language and English. Only one participant (S010) did not consider his/her native language, but English, to be the most comfortable language to use. However, all respondents agreed that English was the most important language for their university studies and that it was the language they felt most comfortable using for academic purposes. Consequently, they chose “very good”, “good”, and “acceptable” when referring to different academic contexts of English language use. More specifically, most respondents assessed their competencies as “very good” (71.4%) when “talking to English-speaking international students (informal/ causal conversations)” and “good” when “writing academic papers” (71.4%). Only one person (S009) chose “poor” (i.e. option “4” on a five-point Likert scale) for “writing academic papers” and one person (S009) for “giving presentations”.

As a summary, several parameters of the participants' multifaceted heterogeneity are visualized in Figure 6.

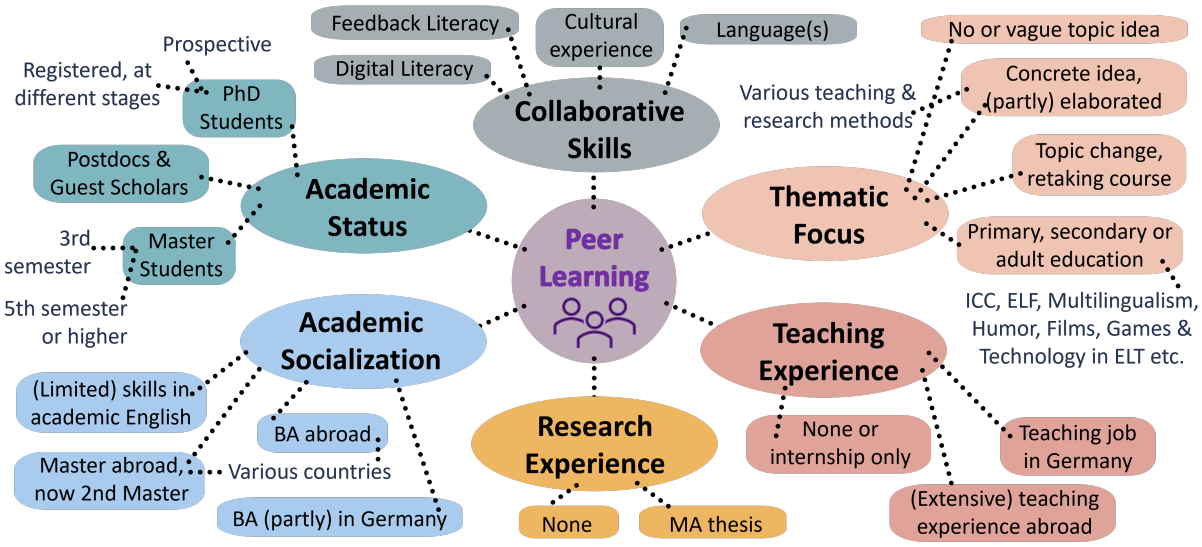


Figure 6: Dimensions of Participants' Heterogeneity in the TESOL Research Colloquium

Each of these aspects is worth further investigation in order to determine their impact on peer feedback processes and learning outcomes, but due to the limited sample size, these factors can only be considered to a limited extent in the ensuing presentation of results.

4.3. Results from Survey 1 (Cloud Feedback/ Digital Boards)

Survey 1 (questionnaire on cloud applications) was filled in by the students after they had completed the peer feedback task on cloud applications. Most participants chose the digital board tool Padlet (https://padlet.com/) for this task.

4.3.1. Prior Experience with or Usage of Cloud Applications

The survey first inquired into students' previous familiarity with cloud applications. Most students stated that they knew Google cloud applications (N=10), Padlet (N=7) and TUC Cloud (N=7), with the latter being the cloud space of the university. N=2 also adduced Dropbox and Jamboard. Further applications that were mentioned were Etherpad, YoPad, Zumpad, Wakelet, OneDrive, and Office 365 (N=1 each).

Based on the participants' responses, their proficiency in cloud applications before the start of the study was broadly classified into three stages, namely Advanced (N=6, 43%), Intermediate (N=5, 36%), and Beginner (N=3, 21%), as shown in Figure 7. However, it is important to note that students' self-assessed proficiency varied for different cloud applications. For example, S004 mentioned being a "proficient user" of Google Forms, but a "moderate user" of Padlet. To avoid duplicating the counts, S004 was classified as "Advanced" in the overview above. A

similar case applied to S012, as she "consider[ed] [her]self proficient" for Padlet and TUC Cloud, but "not so much as I haven't used it that extensively" for Google Docs.

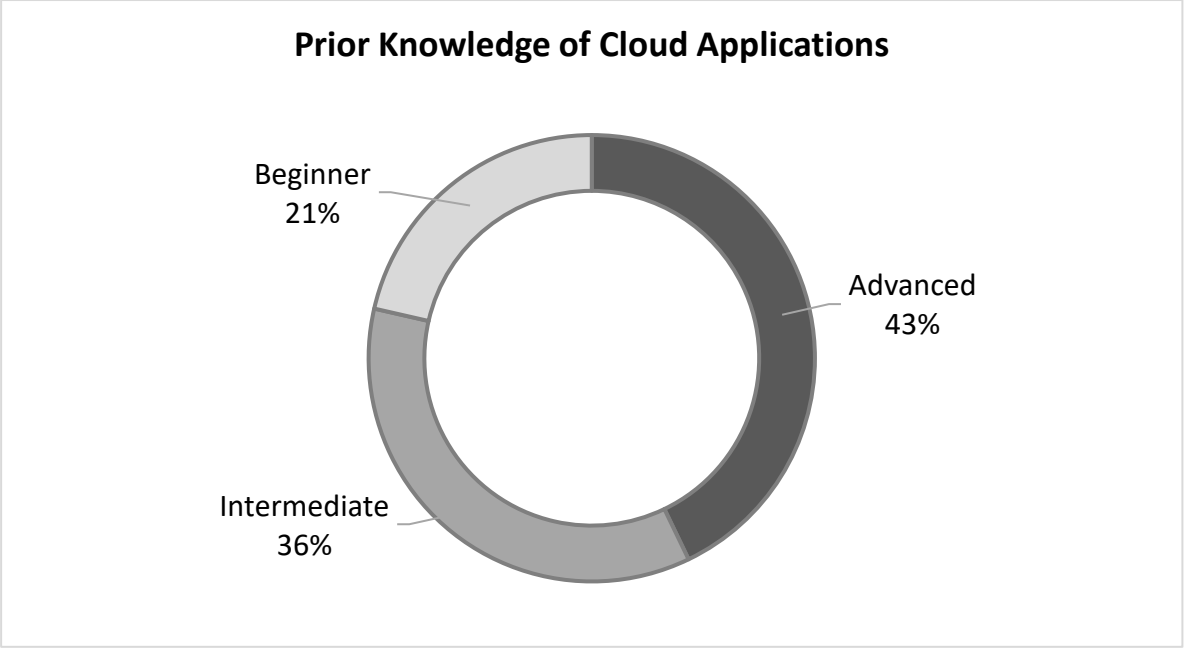


Figure 7: Prior Familiarity with Cloud Applications

4.3.2. Usage of Cloud Applications for Peer Feedback Purposes

For the first peer feedback phase, the students could choose to use more than one cloud tool to record their ideas (S004: Padlet and Google Docs; S005: Padlet, TUC Cloud and OneDrive; S008: Padlet, Google Docs and TUC Cloud). However, nearly all students selected Padlet to note down their research ideas (N=13) or another very similar application, i.e. Jamboard (N=1). This was followed by Google Docs (N=3), TUC cloud (N=2) and OneDrive (N=1). No one utilized Google Slides, probably because the features of Google Slides were not considered suitable for the purposes of brainstorming and for rearranging ideas.

When commenting on peers' ideas, everyone consequently used at least Padlet for feedback provision, which will be focused on in this book, while some particularities of the other applications will be summarized in the subsequent sections as well.

4.3.2.1. Padlet

The most frequently cited benefits of Padlet were its user-friendliness (N=9, 64.3%) and the possibility to visualize and format contents (N=8). For example, S012 wrote that Padlet was "easy to use, allows creativity and the interface is very appealing". S013 believed that it was "straightforward even for beginners". Furthermore, S007 mentioned that "Comment Sections, ratings are good for feedback purposes. It is possible to customize the setting of your Padlet wall. It is organized". In terms of formatting, S014 additionally liked the "possibility to structure and connect ideas". In addition, N=5 students regarded the interactivity of Padlet as useful for

feedback purposes. One student elaborated that "[i]t is an easy method to provide a [sic] feedback, every student can see all of other students' feedback and teacher's feedback at the same time" (S002). Similarly, S001 thinks that Padlet "creates a dialogue". Moreover, two students mentioned that feedback on Padlet was personal/ individual (S001, S010). Furthermore, also shy students might have felt encouraged to participate (N=2) since users were able to contribute comments anonymously (S002, S005).

Beyond that, N=4 students considered Padlet's easy access as one of its affordances. Notably, it can be shared easily with teachers or classmates (S001, S009). All feedback is saved automatically, and peers can see it without any downloading, which thus facilitates the peer feedback process (S002). N=4 participants also mentioned that Padlet's comment feature makes local feedback easy, as it enables direct references to specific aspects within a Padlet: "You can comment directly to a certain sentence" (S009). Since students were able see everyone's comments, this function also allowed them to "add answers and comments below other's comments and your name is visible if you are logged in" (S006). In addition, most of Padlet's features are available for free, which was considered as advantageous (S014).

Table 12: Perceived Advantages and Disadvantages of Padlet as a Digital Board (Survey 1)

Advantages	Disadvantages
User-friendliness	Not user-friendly, requires registration
Visualization/ Formatting options	Formatting limited
Interactivity	
Easy access	Technical problems
Convenient for local feedback	Inconvenient for local feedback
Personal feedback	
Anonymous feedback	Authorship unclear
Reduces shyness/ anxiety	
Free of charge	Not completely free

As Table 12 indicates, some students also had opposite views about the same aspects. For instance, although the formatting options of Padlet were seen as an advantage by many participants, it was also regarded as a disadvantage by some others. For example, S001 lamented that posts were arranged vertically and narrowly and worried that such a format would make the feedback look lengthy and make people impatient about reading it. S003 mentioned that the font cannot be changed as desired. In addition, S012 wrote that Padlet "can become quite crowded/ unstructured, the settings need to be adjusted correctly in order to allow commenting, liking, etc.".

In terms of authorship, S005 expressed some concerns. He argued that comments should be labeled with the author's name, whereas other participants saw anonymity as a benefit of

Padlet. In addition, the student feared that it might be problematic if "[e]veryone can edit everyone's comments" (S005). Most of these challenges can be overcome by changing the Padlet settings, though.

As another drawback, S011 and S013 pointed out that Padlet is not completely free since some premium features must be paid. Furthermore, although many students found Padlet's comment feature to be very helpful in giving local feedback, S004 felt that it is not possible to give feedback on specific sentences or words when using Padlet as compared to Google Docs. In addition, S010 remarked that "website and internet problems" may affect usage, and S014 believed that having to register was inconvenient. This, however, is not always required, as it depends on the settings the Padlet author has selected.

On this basis, the participants gave additional advice for the use of Padlet. Their suggestions were categorized into the following five aspects:

Formatting/ Organization: Six participants (S003, S005, S008, S009, S012, S013) provided tips for this category. S005 suggested to "place your comment in a logical place (next to the point you're trying to comment on, not over another comment) to avoid confusion". Some participants offered recommendations for improving the formatting in order to provide local feedback on Padlet, for example "[w]rite your ideas in short windows and divide them according to the ideas so that the feedback senders can give specific feedback to a certain idea" (S009), and "post different topics separately so that every student could comment on the particular topic they liked" (S013).

Learn how to use: Two participants (S002, S012) commented that it was important to learn how to use Padlet before utilizing it. From the user's perspective, S002 suggested that participants should watch some instructional videos first, while S012, from the instructor's perspective, believed that teachers should give clear introductions and guidelines beforehand.

Combination with other feedback methods: S004 wrote, "I want to experiment sending feedback via voice recording and video".

Authorship: S005 believed that "specify[ing] your name at the end of your comment" can help solve the authorship problem. However, this might not be suitable for participants who wish to remain anonymous.

Task Design: S001 suggested that "it would be more interesting if all of the students shared their work on a single Padlet. It will be similar to a digital wall where people can access information at once instead of opening and closing Padlet links in order to view peers' works". However, one could imagine that this would make the Padlet cluttered.

Hence, there appear to be a few aspects that deserve further discussion and training with respect to using Padlet as a digital board for feedback purposes.

4.3.2.2. Jamboard

Two students (S001, S007) mentioned that they had utilized Jamboard to provide peer feedback. Similar to Padlet, Jamboard was considered easy to use and generally user-friendly, but the limitation of the number of words per note and the formatting were seen as disadvantageous. More precisely, S001 thought that the "stickynote function is lovely", and S007 regarded Jamboard as easy to use. As the submitted feedback reveals, there were in fact more than two students who commented on S006's Jamboard. The remaining respondents might not have recognized Jamboard as such, but probably believed that it was a Padlet.

Specifically, S001 highlighted that the limitation in the word count per post is a disadvantage of Jamboard, as it might "demotivat[e] feedback production". S007 adduced the formatting as the biggest shortcoming of Jamboard. In contrast to Padlet, Jamboard does not have a commenting function, which makes it difficult to provide local feedback and to refer to "different points given through feedback" (S007). Instead, the posts appear in different places and cannot be connected to each other.

Thus, the availability or absence of specific tools features appears to be an important criterion to consider when choosing suitable applications for different feedback purposes.

4.3.2.3. Google Docs

Three students (S004, S005, S010) used Google Docs to provide peer feedback. Two of them (S005, S010) regarded Google Docs as a user-friendly, secure, and trustworthy platform. In terms of user-friendliness, S004 found local feedback in Google Docs easier to provide than on Padlet. Furthermore, S005 mentioned that Google Docs will send notifications to users after receiving feedback, which facilitates simultaneous feedback and interactions. Since Google Doc required a login in S005's opinion, he stated that anonymous comments were impossible. In addition, sharing very large files using Google Docs appeared inconvenient because this presupposes sufficient space on Google Drive (S010). In terms of advice for future use, S004 pointed out that it was important to "allow editing before sharing the doc". S005, on the other hand, argued that it was necessary to "[d]ifferentiate between when to suggest edit and when to just add a comment". The main points for Google Docs are summarized in Table 13.

Table 13: Perceived Advantages and Disadvantages of Google Docs as a Cloud-Editor (Survey 1)

Advantages	Disadvantages
User-friendliness	Access problems
Secure/ reliable	Not anonymous
Local feedback possible	
Notification function	
Interactive	
Synchronous commenting	

4.3.2.4. TUC Cloud

Altogether, six students (S003, S005, S009, S010, S011, S012) asserted to have utilized the TUC Cloud to provide peer feedback. Among them, S003 did not answer the questions about TUC Cloud, although she ticked this option in a preceding question. Therefore, it was possible to analyze a total of N=5 responses only. In the participants' view, the advantage of TUC Cloud is that it is embedded in the university platform (S005, S009, S012) so that contents can be shared easily as no separate registration is required. In addition, S010 and S012 considered TUC Cloud as secure and trustworthy. S012 noted that she especially liked the "Read me" feature of TUC Cloud. "Read me" is a file that appears at the top of a folder so that participants can directly view relevant instructions and updates as soon as they open the folder.

On the other hand, three participants believed that TUC Cloud does not offer enough functions and is less user-friendly than other cloud platforms (S005, S011, S012). Two participants additionally remarked that the access is restricted, available only to students and employees of the institution (S009), and that it is not interactive enough (S010). In fact, however, the access and editing options can be adjusted in the sharing settings of TUC Cloud. Accordingly, S012 recommended that before using TUC Cloud for peer feedback purposes, one should make sure that participants "know what settings to choose when sharing documents". She also suggested that instructors could create collaborative folders on TUC Cloud beforehand and distribute the links via email to the participants. Hence, awareness of tool features and their skilled use again appear crucial and need to be accompanied by a clarification of student and teacher roles as well as responsibilities.

4.3.2.5. Other Cloud Applications

Finally, two students claimed to have used further applications to provide peer feedback. One student mentioned Etherpad and the other one "Word Doc, Wakelet". S011 used Word, which she considered "not complicated, more common and easy to use" for peer feedback purposes.

S012 used Etherpad and gave detailed feedback. As advantages, she mentioned that Etherpad is free as well as easy to access, and that its color-coding system is very useful. The disadvantages are that it is "unstructured … just a very long document" (S012). Thus, if many participants use a pad at the same time, it might become very "confusing" in her opinion. Although the color-coding was considered useful, she remarked that many of the colors look very similar, making it difficult to distinguish between different reviews. Based on this, S012 recommended that Etherpad should be used in smaller groups only, preferably with a maximum of five people.

4.3.3. Evaluation of Peer Feedback on Cloud-Based Digital Board Applications

Following the assessment of the digital tools, students were asked, "How useful do you consider the peer feedback that you have received in your chosen cloud application?" Here, seven participants gave the highest score 5 (highly useful), representing 50% of the total. One person (S001) rated it as 1 (not useful at all), accounting for 7.1%; another person (S005) ranked it as 2 (slightly useful); still another person (S010) assessed it as 3 (somewhat useful); four people (S007, S009, S013, S014) rated it as 4 (mostly useful).

Collectively, 11 persons (78.6%) thus considered cloud feedback to be mostly useful (4) or very useful (5), whereas 3 people (21.4%) assessed the peer feedback via cloud applications to be not useful at all (1) or somewhat useful (3). The replies to the open question offer insights into the underlying reasons for the evaluation, as summarized in Table 14.

Table 14: Evaluation of Peer Feedback Received via Cloud Applications

Positive Evaluation	Negative Evaluation	Suggestions
User-friendliness	(A)synchronous nature	Combination with other feedback methods
Specific/ personal	Not personal/ generic	
Formatting		
Easy access		
Informative		
Interesting/ modern		

As can be seen, the participants' evaluations were divided into three categories during the coding process: positive evaluations, negative evaluations, and recommendations. Positive evaluation means that the participants were satisfied with and positive about using the cloud application for peer feedback purposes, as will be detailed next.

4.3.3.1. Positive Evaluations of Peer Feedback on Digital Boards

Notably, six participants thought that the feedback they received through the cloud application was informative (S008, S009, S011, S012, S013, S014). It is worth noting that all of them gave a rating of four or five in the preceding question. For example, S011 wrote that the peer feedback was "highly useful because […] it helps a lot to improve [one]self or learn new ideas with these peer comments". S012 remarked that the peers "gave constructive criticism on what might not work out (e.g. topic is not narrowed down yet, outcome of research might be obvious)". Three participants considered the feedback to be very specific and personal (S002, S003, S012): "The comments of my classmates alerted me to be specific with my topic and with my research questions and that helped me to dig deeper in my research" (S002); "I liked that some peers asked (critical) questions to make sure I understand on what aspects I still need to work

on" (S012). S004 and S006 favored the format because it allowed them to see all the feedback and comments on one page (they were presumably referring to Padlet here). S006 also considered it as very easy to use and share. Interestingly, S011 mentioned that using cloud applications for feedback is very new and interesting and "takes it out of the boring and traditional".

4.3.3.2. Negative Evaluations of Peer Feedback on Digital Boards

In contrast to the previous view that peer feedback on cloud applications was personal and specific, four participants believed that the feedback they received was not personal, too broad, and not helpful (S001, S005, S007, S009). Among them, S001 gave a score of 1 in the previous question and S005 assigned a score of 2, i.e. they considered the feedback as (hardly) useful. By contrast, both S007 and S009 chose a score of 4. It should also be noted that S010 provided a rating of 3, but unfortunately did not answer the next questions, so we do not know exactly why she gave this rating. However, S001 explained that she was disappointed with the response she obtained, saying that

> "the comments I received were superficial, such as 'Oh, it is interesting.' I posted questions there in order to generate some ideas, but nobody commented on them. Possibly, my peers were clueless about my questions".

S009 seemed to share this sentiment, believing that her peers did not understand the area of her research and therefore could only give brief, unhelpful comments. S005 thought that many of his peers lacked motivation and only commented to get the task done. Accordingly, he was not satisfied with the quality of the comments he received:

> "Most peer feedback is motivated by the necessity of providing feedback since it is given as an assignment, therefore most of the feedback is either irrelevant or condescending or both (comments that lack purpose "I like it", "I don't like it", negative comments for the sake of giving comments, and people "suggesting" useless adjustments just to try to provide "constructive criticism")".

However, S005 also mentioned that this does not represent all feedback, as he also obtained helpful and constructive comments. S007 ascribed the reasons for receiving unhelpful feedback to herself, saying that "I could not decide on my thesis topic yet and wrote my brainstorming ideas on my Padlet wall. This was not easy for others to give feedback".

4.3.3.3. Participants' Recommendations for Peer Feedback on Digital Boards

Overall, for successful peer review, it seems important to bear in mind the influence of prior knowledge (especially imbalances in topic expertise), the nature of the posted contents for review, and the impact of familiarity with feedback principles as well as internal and external motivations. Furthermore, appropriate tool choices and settings are crucial. In that respect,

S004 reflected on the nature of cloud applications, remarked that they fall between synchronous and non-synchronous, and considered this as a drawback:

> "As I didn't plan a specific time to check feedback and it all happened randomly when I was busy with some other work on the internet, I realized that it did not feel like a real commitment. As I am [a] serious learner, this aspect of feedback interaction did not appeal to me. Maybe, I should spare a specific time when I check all the feedback responses, but when I see the notification, I cannot avoid".

In addition, S004 suggested trying a combination of text-based cloud comments with video or audio feedback. Indeed, the latter feedback formats were deployed in the following peer review phase that will be addressed next.

4.4. Results from Survey 2 (Recorded Feedback)

Survey 2 (questionnaire on recorded feedback) was implemented to obtain the participants' evaluations of digitally recorded peer feedback. However, N=5 participants already filled out this questionnaire after having received feedback from one peer only, so some of the data is missing. Critically, S008 did not respond to any open questions, but only answered the multiple-choice items. In the future, the questionnaire link should therefore only be activated after each participant obtained digitally recorded feedback from both peers, as will be critically discussed in section 5.5.1.

4.4.1. Prior Experience with or Usage of Recorded Feedback

At the beginning of survey 2, students were asked about their prior experiences in producing or receiving digitally recoded feedback. For this, they selected "never", "once", 2-5 times" or "more than 5 times". It turned out that overall, the participants in the current sample had either never or only occasionally produced recorded feedback before attending the seminar. If used, it mostly was **audio feedback**, which only four students (S002, S004, S006, S007) had never utilized beforehand. Among the students who produced audio feedback, four had used it once (S003, S008, S009), three 2-5 times (S001, S011, S014), and two (S003, S005) more than 5 times. Similarly, from the reception perspective, audio feedback stood out, with only five participants (S001, S002, S004, S007, S013) never having received it before. Of the seven who obtained it, two (S008, S012) had received it once, three 2-5 times (S006, S011, S014), and two (S003, S005) more than five times.

The feedback method that appeared most unfamiliar was **combination screencast feedback**, with 11 students indicating that they had never used it, only one student having produced it once (S013), and another student having received and used it 2-5 times (S008). This was followed by **talking-head video feedback**, which nine students had never created, one student

(S013) once, and three students (S003, S008, S009) 2-5 times. From the reception side, two (S008, S009) had obtained talking-head video feedback once and one person (S003) 2-5 times.

For **screencast feedback**, four students had never employed it actively for feedback production (S001, S002, S003, S004), seven students once (S005, S006, S007, S008, S009, S012, S013), and two students 2-5 times (S011, S014). In terms of feedback reception, three participants (S006, S011, S012) claimed to have obtained screencast feedback once and two participants 2-5 times (S008, S014).

It is worth noting that S002 and S004 had never utilized any recorded feedback before. S008 and S013, on the other hand, had experience with all four of the above-mentioned feedback methods. As feedback recipients, S001, S002, S004, S007, S013 had never obtained any kind of digitally recorded feedback prior to the seminar. Combined with the previous questions, we find that S002 and S004 had never produced digitally recorded feedback, nor had they ever received such types of feedback before this seminar.

When asked about other digital feedback methods, S011 wrote that she usually received synchronous feedback in video conferences, or chat feedback in written or voice form via messengers such as WhatsApp. S012 mentioned that she obtained cloud-editor feedback and forum feedback in previous seminars.

S009 only completed the column for talking-head video feedback and did not fill in the other columns, probably because she thought she only needed to pick the feedback method that she had employed. In the revised survey, such questions should therefore be modified so that each column must be filled in (see discussion section 5.5.1).

4.4.2. Usage of Digital Recordings for Peer Feedback Purposes

During the TRC (winter term 2022/23), audio feedback had been used more frequently by the participants (N=15) than screencast feedback (N=8). Combined screencast feedback, i.e. the combination of screencast and talking-head video, has been included only once at the beginning of a video. Talking-head video feedback (only speaker image) was not chosen by anyone. The next subsections will elucidate the perceived advantages, limitations and reasons for choosing these methods from the peers' perspectives as feedback producers and recipients.

4.4.2.1. Audio Feedback

To start with, Table 15 outlines the advantages, disadvantages and reasons for using audio feedback that were mentioned by the respondents of survey 2.

Table 15: Evaluation of Audio Feedback Production

Advantages	Disadvantages	Reasons for using
Quick/ convenient to produce	No visualization	Easy/ less time-consuming
Personal/ personalized	Localization difficult	Familiar/ less awkward
Informative/ detailed	No gestures/ no facial expression visible	Trying different methods
Referring to notes	Tone/ intonation	Personal
	Slips of tongue	No need for visual feedback
	Unable to completely convey meaning and emotion	

All in all, the most frequently mentioned advantage of audio feedback was that it was very easy and fast to record (S003, S005, S007, S011, S012), which is probably why most participants chose it for the recorded feedback step. S003 stated that there was "no stress, no real preparation, no need to memorize" in audio feedback production. S012 mentioned that recording audio feedback did not require complex equipment or software, "one can simply use their phone to record an audio". S011 compared screencast feedback to audio feedback and felt that she needed to be more careful in creating screencasts, saying that "I have to constantly show the part where I talk with the computer mouse […] – it gets complicated when the timings don't match". For this reason, she would get "more panicked" during screencasting as compared to providing audio feedback.

However, many feedback receivers may find it difficult to localize the feedback when there is no visual support (see section 2.6.4.1). Accordingly, the most frequently cited disadvantage for audio feedback was the lack of visualization and the resultant difficulty to locate where the feedback giver was referring to in the reviewed draft (S002, S006, S009, S011, S012, S014). To exemplify, S002 stated that "It was not easy to follow the feedback (know where exactly) without screen-casting". This was more evident when the feedback provider referred to literature, terminology, and abbreviations that were unfamiliar to the feedback recipient. S012 gave examples from the feedback she received:

> "Some words can be hard to understand (you do not know the spelling of technical terms and foreign words, so you cannot get more information about them). For instance, [S005] mentioned CALP and BICS in his Audio FB and at first I did not know what to search for because I was not familiar with the abbreviations. References to studies are often only mentioned by name and year but you do not receive the full source".

Interestingly, her feedback partner S005 believed that "the type of content we are providing feedback for […] does not necessitate visual feedback", which is why he chose audio feedback for this task. Hence, the perceptions by the feedback producer and feedback recipient were

opposing each other in that respect. Some feedback givers seemed to circumvent this problem by not providing feedback on specific contents, but then the feedback recipient would consider the feedback as too general and not specific, "very superficial in comparison to screencast feedback" (S004)[5].

In addition, the inability to see gestures and facial expressions of the feedback provider might also make the feedback recipient misinterpret the feedback giver's emotions (S013). The tone of voice is therefore very important when providing audio feedback. However, "[i]f you are not used to doing it, it is not easy to control your voice" (S007); or "the person who gives the feedback may use rude intonation accidentally and sound unfriendly" (S013). S012 also mentioned the possibility of slips of the tongue or too many filler words, such as "eh" or "well" when recording audio feedback. These are also obstacles for feedback providers to overcome. Furthermore, S003 believed that audio feedback cannot fully convey the emotion and meaning of the feedback provider. This stands in contrast to one-to-one feedback in person. Furthermore, from the recipients' part, S011 commented that pronunciation problems can cause her to misunderstand or lose some content. In addition, the feedback receiver needs a quiet environment to listen to the audio feedback, which is not always possible (S011).

On the other hand, a strategic emphasis through the tone of the voice can also help feedback recipients understand what they should pay more attention to (S014). More generally, S001 likewise wrote that audio feedback "forces [her] to pay close attention to the feedback [she] received". She thinks that audio feedback was less demanding for the senses than screencast feedback because she only needs to concentrate on the audio instead of having to listen and watch at the same time. This allowed her to receive feedback in a more focused way.

Two participants (S009, S012) even considered audio feedback to be more effective and informative than traditional feedback methods. They believed that this format would allow the feedback providers to explain their ideas more elaborately. S005 and S014 also mentioned that, while looking at the submission, audio feedback was "easier to follow along" (S005). However, if the feedback provider did not prepare in advance, but actually started recording randomly like a WhatsApp voice message, "[t]he comments might be unstructured and you cannot really track what aspect the FB provider is talking about" (S012). Moreover, S006 considered a long audio file without visuals to be "boring". Similarly, S011 wrote that she was more used to "read or watch"; thus, audio feedback made it difficult for her to "catch the point".

Hence, somewhat diverging views became apparent, not only among individual students, but also between feedback providers' and recipients' perspectives. As a complement to Table

[5] However, it was possible for the students to share further details, e.g. about the publications they were referring to, on the course cloud or outside of the course. In later dialogues, it turned out that at least some of them indeed communicated about their theses outside of the course setting, as was also indicated in some passages of their written feedback (see subsections called "References" in the feedback analyses).

15 dealing with providers' perceptions, the perceived advantages and challenges of audio feedback from the recipients' standpoint are summarized in Table 16.

Table 16: Evaluation of Audio Feedback Reception

Advantages	Disadvantages
Personal	No visualization
Able to listen whenever/ wherever and many times	Localization problems
Easy access	Unable to check references and abbreviations mentioned in the feedback
Effective/ informative/ detailed	Too general/ not specific
Intonation/ vocal emphasis	Pronunciation issues
Easy to follow	Need silent space to listen
Focused feedback	Unstructured feedback
	Not really dialogical

Nonetheless, there were also shared opinions between feedback producers and recipients, notably that the audio format made the feedback appear more personal than the written comments (S001, S004, S006, S009, S012). For example, S001 found it very much like voice messaging on a chat app, which made her feel very relaxed about providing feedback, as if she was talking to a friend. Likewise, from the recipients' perspective, S004 mentioned that audio feedback was very much like WhatsApp's voice messages, which made the feedback producer appear friendly. Additionally, S006 believed that she was able to better understand the emotions the feedback providers conveyed through their voice. S009 also noted that audio would include more information (probably as compared to written feedback, but this was not specified in her comment). Finally, S012 added that this personalization through audio messaging might be particularly valuable "in online teaching times". Accordingly, voice can have a positive effect on conveying emotions and building connections.

However, S001 raised concerns about the value of recorded voice for social interactions. She believed that the use of voice should inspire people to make social connections. However, audio feedback as recorded asynchronous feedback might prevent the recipients from engaging in further communication and exchange process in a timely manner. Therefore, she "would argue that audio feedback weakly supports the dialogical nature of feedback" (S001). In the end, it might all depend on whether there is follow-up communication, and in what ways it occurs. In fact, there was one person (S003) who replied to the feedback she received by creating another recording (see analysis in section 4.8.10). Certainly, though, recorded feedback is less dialogical than live communication due to its asynchronous nature.

Still, the asynchronicity is advantageous in other ways. Four participants (S002, S005, S011, S013) mentioned that audio feedback was easily accessible and that they were able to

listen to the messages repeatedly at any time and any place. As S013 stated, "[o]ne of the most important advantages to me is that the person can listen to the feedback in her/his own free time and several times. Listening to it several times may help the person process the information better".

From the producers' side, S012 reasoned that one could easily refer to notes prepared in advance without having to memorize them for the recording of audio feedback. Other feedback methods, such as talking-head video feedback, required memorization of the notes in advance, as the feedback giver should look directly into the camera most of the time. These notes can be distributed to the peers along with the audio feedback (S011), which could also alleviate localization problems for the recipients. Furthermore, S001 wrote that with audio feedback, she did "not need to scroll down and up on the screen to indicate where [she was] referring to", which might be convenient for the feedback giver.

Regarding the reasons for using audio feedback, four participants (S001, S007, S012, S013) wrote that it was the fastest and easiest way to provide feedback to their peers. For example, S001 remarked that she had problems with her computer, whereas it was very easy to record audio feedback by simply using her mobile phone. S003 and S005 felt that providing feedback in this way was the most comfortable and least awkward. This idea may have been derived from a comparison with talking-head video feedback. S011 mentioned that her peer had already received a video from another fellow student and that she therefore created audio feedback to experience a variety of feedback formats. S013 said she had used screencast feedback in previous seminars and wanted to try a new form of feedback this time.

4.4.2.2. Screencast Feedback

Based on the replies to survey 2, Table 17 synthesizes the perceived benefits, limitations and reasons for using screencasting to produce peer feedback.

Table 17: Evaluation of Screencast Feedback Production

Advantages	Disadvantages	Reasons for using
Localization	No gestures/ no facial expressions	Localization/ specification
Visualization	Technology/ skills required	Trying different methods
Informative/ detailed	Not comfortable speaking	Effective
Referring to notes		

Altogether, four screencast feedback producers (S002, S004, S006, S014) contributed answers to this question. They all mentioned visualization and localization as the main advantages of screencast feedback, which helps to overcome the major limitations of audio feedback (see section 4.4.2.1). Analogously, the two recipients (S004, S007) who gave responses to this

question agreed that the advantages of screencast feedback were its visualization and the resultant possibility to better localize the aspects the feedback is referring to (see Table 18).

Table 18: Evaluation of Screencast Feedback Reception

Advantages	Disadvantages
Visualization	Affordances of screencasting not fully seized, e.g. highlighting
Localization	

To exemplify, S004 adduced that screencast feedback allowed feedback recipients to "follow the part visually where the feedback is addressed to". Similarly, the feedback producer S014 wrote that "[c]ombining audio feedback with the visualization of the feedback subject is very helpful to properly show what exactly is being reviewed and facilitates following the train of thought". This may also be why S006 believed that screencast feedback is "both effective and practical". Similarly, S007 did not see any downside to screencast feedback from the recipients' standpoint: "I cannot see any limitations in the video".

Conversely, others remarked that the biggest disadvantage of screencast feedback was the same as the one that was previously mentioned for audio feedback. Since it is impossible to see the feedback provider's gestures, expressions etc., the recipient may misinterpret the emotional message (S002, S006). Furthermore, S014 claimed that screencast feedback "requires relatively recent technology", which might be a challenge for the feedback producer. Furthermore, S004 was disturbed by the voice recording of screencast feedback: "I did not feel comfortable speaking. I realised that it was unnecessarily detailed and conversational." However, probably this can be overcome by practice and preparing notes in advance (cf. section 4.4.2.1). From the recipients' perspective, S004 realized that "[w]hen my peer gave me feedback, she did not highlight some parts or make the relevant section bigger so that I could see what she was referring to". This is obviously not a disadvantage of screencast feedback, but rather a result of the feedback provider not being familiar with recording screencasts and seizing its features effectively.

Finally, S002 mentioned that she chose screencasting in order to try out new methods, which is the same argument that S013 adduced for audio feedback – and the same that S002 provided for combination screencast to which we will turn next.

4.4.2.3. Combination Screencast Feedback (With Talking Head)

Since only S002 used this format for feedback production, she was the only participant who responded to this question. Her arguments are summarized in Table 19.

Table 19: Evaluation of Combination Screencast Feedback Production

Advantages	Disadvantages	Reasons for using
Localization	Need to memorize the content beforehand	Trying new methods
Personal		

Regarding advantages, S002 wrote that combination screencast feedback "helps students go along with the feedback step by step and see directly where the feedback is given". This is in line with the advantages mentioned for screencast feedback (see section 4.4.2.2 above). Compared with screencast feedback (screen only), however, combination screencast feedback appears more personal, as it "gives the feeling as the one who gives the feedback is sitting near the student who receives the feedback and talking to him directly" (S002). This view was shared by her feedback partner S003, who likewise perceived a higher degree of personalization as compared to audio and screencast feedback: "Because I could see her, I felt I could get more connection with her[,] and more acceptance […]" might result from this.

As disadvantage, S002 stated that the feedback producer needed to memorize the feedback beforehand "in order not to read from the notes […] in front of the camera (the student)". This might add more pressure and time cost for the feedback producer.

S003 also mentioned two drawbacks of the combination screencast feedback that she received, which are video quality and download problems. She deplored that the video was not of high quality and that the sound was breaking up, which prevented her from fully understanding what the feedback provider was trying to express. In addition, probably because the video files were too large, "the video was downloaded slowly" (S003).

Overall, S002 seemed to be a participant who liked trying new ways of giving feedback. She had never used any digitally recorded feedback before this seminar, so this was a new experience for her. S002 was also the only feedback provider in this peer feedback task who created feedback in two different ways: combination screencast feedback and screencast feedback because she wanted to explore something new (see section 4.4.2.1).

4.4.3. Evaluation of Digitally Recorded Peer Feedback

Generally, for digitally recorded feedback, more negative evaluations were obtained than for cloud feedback on digital boards. In total, ten participants answered this question, whereas three participants left it empty (S001, S002, S005). Five participants (S003, S008, S009, S011, S013) gave a score of 4 (mostly useful), which accounts for 50% of the total answers. Four participants (S004, S007, S012, S014), i.e. 40%, selected the score 3 (somewhat useful). One participant (S006) ranked it as 1 (not at all useful), representing 10% of the answers. No participant considered it highly useful.

Together with the reasons given for this evaluation, a broad categorization into two groups can be attempted, namely positive and negative evaluations. 1 (not useful at all) and 3 (somewhat useful) were classified as rather negative evaluations, while 4 (mostly useful) was classified as a positive rating. Table 20 summarizes the rationale for these evaluations, with the subsequent sections providing further details.

Table 20: Evaluation of Peer Feedback Received as Digital Recordings

Positive evaluation	Negative evaluation
Informative	Not useful
Easy access, digital	Not ready for receiving feedback
Permanent storage	Too general/ not specific
Experience sharing with peers	Did not receive feedback

4.4.3.1. Positive Evaluations of Digitally Recorded Peer Feedback

All in all, five participants (S003, S008, S009, S011, S013) gave positive ratings. However, S008 did not provide any reasons for this evaluation. Three respondents (S003, S011, S013) found the feedback very informative: “It is useful because feedback touched upon the important point in my research plan. There were questions and infos [sic] for me/ for the further research” (S011). More generally, S009 liked to receive feedback digitally: “I appreciate the digital way because it suits the eLearning that we do need nowadays”. In addition, S009 mentioned the easy access of feedback in digital form and the ability to listen or watch it anywhere and anytime. Besides these, S011 shared positive comments on the peer feedback approach, since she realized that her peers had the same problems and experiences as she had, which allowed them to better “understand, help each other” (S011).

4.4.3.2. Negative Evaluations of Digitally Recorded Peer Feedback

Five participants (S004, S006, S007, S012, S014) gave negative ratings. Among them, S006 assessed the digitally recorded feedback as “not at all useful”, while the other four participants rated it as “somewhat useful”. More precisely, S006 and S007 stated that they considered the feedback received as not useful but unhelpful. S006 contemplated that his peers had no experience in writing a Master thesis and could not give him effective feedback. Similarly, S007 reasoned that her peers were at the same stage of thesis preparation as she was, and therefore doubted that they had sufficient expertise or experience “to provide feedback in that context”. S004 wrote that she was not yet ready for peer feedback: “I know that I still have a lot of work to do in order to finalise my plan before I would want someone else to reflect on my incomplete plan”. Moreover, S012 considered the feedback she received to be too broad and unspecific. Finally, S014 gave a rating of 3 (somewhat useful) even though she had not received any digitally recorded peer feedback at the time of completing this survey.

4.4.3.3. Participants' Recommendations for Digitally Recorded Peer Feedback

In light of their perceptions and experiences, the students were asked about further tips for using these feedback methods. The wording of the question was, "What tips or recommendations do you want to share regarding XY feedback [e.g., XY = screencast feedback]? For example, based on what has worked well or not so well when you produced or received feedback in that way."

As for **audio feedback**, S005, S011 and S012 emphasized the importance of adequate preparation before starting the recording. All of them mentioned that it was essential to write notes and keywords prior to the recording to avoid a lack of structure or verbal fluency. S005 described in detail the recommended preparatory steps:

> "First thing to do is to read the material that needs to be given feedback and write keywords of ideas you need to give feedback on. Then read the material a second time and develop the points into full bullet points. Finally write a loose script of the feedback to be given, before recording it."

Furthermore, S009 and S011 made suggestions for the structure of the feedback. S009 mentioned that the feedback sandwich should be used even if the feedback is short. This means that criticism should be framed within positive remarks. S011's suggestions were similar, although she did not use the term feedback sandwich. However, she described in detail the structure of the feedback she provided:

> "Introduction, introducing myself and then my comments for each part […]. My questions, giving some examples. I also gave some suggestions regarding […] the topic and sources. Then conclusion part. It should be very descriptive and detailed."

Regarding voice and comprehensibility, S002, S011 and S014 suggested that feedback providers should pay attention to the pace of their speech and should speak clearly enough for feedback recipients to understand and follow along. Furthermore, S009 suggested that the feedback should be recorded in a more conversational manner, i.e. as if "talk[ing] directly to the students". However, avoiding overly broad feedback would also be important.

Another possible strategy to facilitate comprehension is to generate subtitles for the recorded audio. S011 explained that she used "veed.io (adding voice record[ing], and converting to text)" to add subtitles to the audio feedback she received. This way, she was able to see the captions and listen to the audio feedback at the same time.

In terms of required technical equipment, S013 mentioned that she used her phone to record audio feedback, which made feedback production very easy. There was no need to download any software, as the recording function that comes with the phone was sufficient. However, the feedback could also be made "more attractive" (S001) via additional editing. In that respect, audio feedback reminded S001 of broadcasting on radio. She felt that adding

background music to the recording would allow the feedback provider to "find it more exciting to produce it". This may also make it "more attractive" to the feedback recipient (S001).

To facilitate localization of the aspects addressed in the audio feedback, S002 suggested that the provider should offer more explicit guidance to help the recipient contextualize the feedback. This is important because audio feedback (as a separate file) does not allow the feedback recipient to see where the feedback provider is referring to in the draft. Additionally, S012 proposed combining audio feedback with the track changes functionality of the text editor (e.g. Microsoft Word), which could compensate for localization problems and contribute to making the feedback more visual.

Lastly, S009 offered advice on how instructor and peer feedback processes can be combined and improved. She recommended that "the teacher shouldn't send one feedback file for different tasks". She also suggested that after the peer feedback, instructors could likewise record audio feedback for the students.

Turning to **talking-head video feedback**, students provided some suggestions as well. S002 and S012 emphasized the importance of prior preparation. Similar to audio feedback, S012 suggested preparing notes before starting the recording. With particular regard to talking-head video feedback, S002 further stressed memorizing the notes beforehand to be more focused during the recording. Moreover, as the speaker's image is visible, the feedback providers should "[b]e aware of facial expressions. The more boring your facial expressions are, the more boring the feedback will be for the viewer" (S005).

Regarding equipment, S013 said she had used the software Loom to record talking-head video feedback. However, S013 did not create talking-head video feedback in this task, so this may have referred to her previous experiences.

With regard to **screencast feedback**, some recommendations resonated with the preceding feedback formats, but due to its special characteristics, also additional aspects were mentioned. Notably, as S014 suggested, the feedback provider should not hesitate to "use [their] cursor, highlights, and other effects to illustrate [their] feedback" (S014). Similarly, S004 stated that the feedback provider should highlight parts of the text whenever appropriate, which would enable the feedback recipients to better follow along. S009 recommended that feedback providers should "use signs like arrows and circles to ooibt [sic: point?] to the mistakes". Although it is possible to scroll the pages and move the cursor when recording a screencast video, feedback providers should not exaggerate this, according to two students (S005, S009), because it would make it difficult for the recipient to concentrate on what is being said. Moreover, S012 proposed that the feedback provider should introduce a color scheme at the beginning of the screencast video. Furthermore, both S004 and S009 emphasized giving general (overall) feedback before discussing the details. As a more general remark, two respondents further suggested to "speak clearly" (S002) as well "friendly and gently and professionally" (S009).

In terms of tools, S013 mentioned that she used Camtasia to record screencast feedback: It "allows you to design enjoyable and modern screencast feedback that will grasp the receiver's attention from the beginning". S013 also recommended trying it a few more times before using it for the actual feedback.

For **combination screencast feedback with speaker image**, S002 advised producers to work on a computer. When she tried utilizing her mobile phone for the recording, her "photo didn't appear" (S002). Eventually, S013 "recommend[ed] "a lot of practice especially if you are creating this kind of video for the first time".

In stark contrast, the usage of online forums did not require much technical expertise, as the next section will reveal.

4.5. Results from Survey 3 (Forum Feedback)

Survey 3 (questionnaire on forum feedback) collected data on how forum feedback was evaluated by the course participants.

4.5.1. Prior Experience with or Usage of Forum Feedback

While six participants (46.2%) claimed to have utilized online forums before this seminar, seven others (53.8%) said they had not. The six users specified the types of forums they had engaged with previously. Among them, five (S004, S005, S007, S012, S014), i.e. the majority (83.3%), mentioned that they had utilized **forums on learning platforms**. S004 remarked that she had used a forum in her English teaching seminar to "interact with course participants about any questions that were raised in the forum". S012 noted that she had utilized forums on the learning platform OPAL to give feedback to her peers, and that the process was similar to the present forum feedback activity: "We were asked to upload our presentation and our peers provided feedback in the forum. It also worked as a discussion forum for topics and issues discussed in the seminar". Additionally, S012 mentioned that she would use **general forums** to seek help for topics like "technology problems, traveling, ideas for upcoming birthdays, or recipes". Moreover, S011 wrote about her use of a "**student forum**", which she described as a platform for students living in Germany to share information and life experiences with each other.

Regarding the frequency of prior usage, one participant (S002) mentioned that she was now using it once a week and perceived the forum feedback provided by other students as very useful. One participant (S005) stated that he used it a few times a year. He believed that the forum can be very useful if people have serious discussions about the topic. Another participant (S003) estimated the frequency to once a year. She found the forum very helpful because she could share her opinion with others and obtain useful feedback there. Finally, four participants (S004, S007, S013, S014) wrote that they rarely used a forum. Generally, all of them considered the use of forums helpful, though.

4.5.2. Usage of Online Forums for Peer Feedback Purposes

By analogy to the foregoing formative surveys, participants were asked to reflect on the advantages and disadvantages they perceived as feedback producers and recipients when engaging in the forum activity. However, due to an error in the survey design, the question on the disadvantages of forum feedback was not initially shown to the participants but was distributed in a short follow-up survey (from N=12 participants, i.e. except for S014). This omission was corrected in the modified version (see discussion section 5.5.1). However, some participants already pointed to weaknesses of forum feedback while adducing the reasons for their ratings in the originally disseminated survey (question 7). The results will be expounded below.

4.5.2.1. Perceived Advantages of Forum Feedback

All thirteen participants disclosed their thoughts about the advantages of forum feedback from the producer perspective. However, for the feedback recipients' view, we only obtained 12 open-response comments, since S004 did not receive feedback in the forum but only provided it. In the rows of Table 21, the advantages of forum feedback identified from the feedback providers' survey responses are matched to the benefits adduced from the feedback recipients' perspective. A comparison by rows shows that they are complementary to a large extent while additionally shedding light on the two sides of the peer feedback process.

Table 21: Advantages of Forum Feedback from Providers' and Recipients' Perspectives

Advantages: Feedback producer perspective	**Advantages: Feedback recipient perspective**
Easy to produce/ less time-consuming	Easy to take notes
Learn about different topics	
Provide more detailed feedback/ Provide feedback from new perspectives	Difficult to follow all new comments
Able to learn about peers' projects	Making progress
Asynchronicity/ Time to think before providing feedback	Receiving higher quality feedback
Communicative/ Dialogic	Dialogic
Structured/ All feedback in one place in chronological order	Organized/ Having all feedback in one place
Easy access	Can be accessed in any place
Written form	Easy to edit (format, font, add link and pictures, etc.)
Less technology knowledge needed	Easy to use

Several participants (S006, S011, S012, S014) found the forum feedback easy and fast to provide. This may have arisen from the comparison to recorded feedback in the preceding

assignment. For instance, as S012 noted, "[i]t is also less time consuming than other (more multimodal) methods". Thus, forum feedback, as a written type of feedback, appears to be easier to share than visual or auditory feedback. Some participants also seemed to prefer this purely written form that was closer to traditional feedback: "it is much better and easier to have it in written form" (S011); "I like that one provides feedback in a written matter" (S012).

Other respondents gave more specific reasons for why the forum feedback was easy to produce and to access. Since the forum is online, participants can ask questions and comment at any time and from anywhere. Likewise, the recipients stated that they could view the latest posts and comments from anywhere, anytime, on different devices (S008, S012). Compared with audio feedback, S012 believed that forum feedback was less restrictive regarding the location. It can even be read in a quiet library: "If I am about to re-write an essay in the library using, for instance, screencast feedback, I would not be able to listen to the feedback. Yet with forum feedback I would not be restricted in using it in quiet work spaces" (S012).

From the producer's side, S012 argued that the written form of the forum feedback made it easier to structure: "This way one can structure their arguments and points very clearly and it is easier to avoid repeating oneself" (S012). Again, this perception may have been influenced by the comparison with audio and screencast feedback. S012 also argued that written feedback demanded less technical knowledge than multimodal feedback and therefore required less preparation time. However, not only the individual forum entries, but also the structure of the entire forums were seen as advantageous. In that regard, the recipients (S005, S006, S007, S008, S014) appreciated that all the feedback was organized on one page in chronological order, allowing them "to see and comment on" "a big number [sic] of feedback in a single place […] (S005); "Rather than searching through a packed inbox of emails, you can simply ask a question within discussion forums and see everyone's responses in a clear, chronological order" (S008).

Compared to audio- or screencasting, these characteristic features of written forums made it easier for the feedback recipients to re-read and analyze the comments (S012, S013) as well as to take notes and highlight specific aspects: "I really like that I can […] even highlight/mark up specific aspects" (S012). Furthermore, they facilitate the skimming of the different forum entries to extract key information, rendering the reception more time-efficient (S012, S013) as opposed to audio- and screencasting.

Not only the feedback recipients, but also the feedback producers seemed to have skimmed other peers' contributions in the forums. Some participants mentioned that the forum activity helped them to offer more detailed feedback or provide feedback from new perspectives. Before giving feedback, students might have read the feedback that other peers had already posted in the forum, which allowed them to give more detailed feedback based on the existing comments (S007), or to try to give feedback from a different perspective (S001, S009). As S001 stated, "I will read others' comments before writing, which I view as an advantage

because I will try to avoid similar feedback. It also indirectly helps me think from different perspectives." In turn, this allowed the feedback recipients to receive higher quality, more insightful feedback to improve their work: "I think this would [be useful for] me [to] find questions to my answers or the students can mention something I didn't pay attention to in order to make a progress in my work" (S002).

However, there was not only a potential learning gain for the immediate feedback recipients, but also for the feedback providers and other peers. Two producers (S002, S003) mentioned that the forum feedback was good for learning about different topics. Since they were asked to give feedback to other peers about the presentations of their Master (or doctoral) thesis, their topics might have been unfamiliar to different degrees[6]. Therefore, before providing feedback, the feedback giver needed to gather information and learn about the topic. This process was seen as helpful by some participants: "[…] you may search for the same topic in order to give other students feedback in order to help in many ways" (S002); "you can get familiar with different ideas and topics and you have to study about them to be able to produce feedback" (S003). In the process, students learn about the contents and progress of their peers' projects, which was the biggest advantage in S004's opinion: "The main advantage for me in the context of Research colloquium course was to learn about other people's projects" (S004).

For some participants, the asynchronous nature of the forum feedback was another advantage. Depending on the pace of contributions, forum feedback can be synchronous and asynchronous, but in practice most participants used it asynchronously. S001 and S013 mentioned that this gave them more time to carefully consider the content of the feedback before posting it. S005 also wrote directly that he liked "the ability to provide asynchonic [sic] feedback, and open discussions". This has similarities to the digital board feedback that was used earlier. Both allow for synchronous and asynchronous commenting, making the feedback more dialogic and communicative (S007, S009). As S007 elaborated, "[o]ne can turn this opportunity into a chat as well through which participants ask and answer questions".

Furthermore, S011 mentioned that the forum feedback was easy to edit: "It is not complicated, you can share your text in every format, you can edit, include your link or pictures. You might even use a tabular [sic] for your forum feedback, and that is fantastic" (S011). In the end, however, the multiple editing and upload features of the forum were hardly ever seized by the participants, as the feedback analysis will show (section 4.9.3).

[6] In fact, however, students already learned about their peers' topics in all preceding phases of the research colloquium. Probably, this comment resulted from the fact that most participants were still insecure about the topic and direction of their research in the first peer feedback phase on Padlet. Additionally, they concentrated on only two fellow students' projects in the preceding recorded feedback activity. Hence, several topics might have indeed been unfamiliar to the commentators in the forums.

4.5.2.2. Perceived Disadvantages of Forum Feedback

In the follow-up question about forum feedback, N=12 participants (i.e. all except for S014) commented on possible disadvantages. Among them, S011 did not list any disadvantages: "[f]rom my point of view, I do not see any disadvantageous point in forum feedback". The other eleven respondents listed some disadvantages of forum feedback from both feedback producer and recipient perspectives, which are synthesized in Table 22.

Table 22: Disadvantages of Forum Feedback from Providers' and Recipients' Perspectives

Disadvantages: Feedback producer perspective	**Disadvantages: Feedback recipient perspective**
Fear of misunderstanding/ unsure if the feedback is clear	Too general/ unclear
Receiver shows no interest	Too many feedback entries
Asynchronous, lack of interaction	Asynchronous, lack of interaction
Fear of providing honest feedback/ being rude	Criticism instead of advice
Fewer social clues	No notification for new comment
Need to switch between tabs	Copying other peer's comments
	Requires internet access/ difficult to download
Unable to access (S002)	Unable to access (S002)

Similar to the coding of the advantages of forum feedback (section 4.5.2.1), it was possible to find complementary disadvantages from both producers' and recipients' perspectives by comparing the entries in the rows of Table 22.

Firstly, from the feedback providers' perspective, six participants (S002, S004, S006, S007, S012, S013) were afraid that they would not be able to express themselves clearly through the forum, thus causing misunderstandings among the feedback recipients: "Since it is only written feedback, it is more difficult to convey the message. Feedback-receiver does not see your face or hear your voice, thus she/he might not be able to recognize the mood of your feedback" (S006); "As a feedback producer, I think that one of the main drawbacks of forum feedback is that it can be interpreted differently by the recipient. No matter how carefully we express our opinions, there is always the chance of misunderstanding" (S013). From the recipients' perspective, three participants (S002, S005, S008) indeed found the forum feedback to be short, unclear or not specific enough ("I found many feedback [sic] short or unclear", S002); "A potential disadvantage of the forum feedback is that it can muddy the message and make it unclear", S008).

Yet, S004 noted that online discussions in live sessions can improve this problem. Additionally, S012 tried to analyze why this situation arose. She argued that written feedback takes

longer to elaborate than verbal feedback, so some participants write vaguely and briefly to save time. This can lead to misunderstandings on the one hand, and on the other hand may make the feedback sound "impersonal and cold, as the feedback producer cannot include social clues into their feedback" (S012). Additionally, S005 mentioned his fear that providing honest feedback would be taken as rude and offensive.

A related disadvantage is the asynchronous nature of forum feedback (S001) and the resulting lack of communication and interaction (S004, S013):

> "For me, as a feedback recipient, one of the disadvantages of forum feedback is that you cannot ask instant questions. For example, when you read a [sic] feedback and you want to clarify something, you have to leave your reply in the forum and wait until the feedback giver answers you, if they answer your question at all" (S013).

On the other hand, three providers (S005, S008, S009) had the impression that the feedback recipients did not seem interested in their feedback: "At other times, it feels like the person who you are giving feedback to is uninterested and it feels like a waste of time" (S005). This disappointing dearth of interaction may also stem from feedback participants not being notified of new messages automatically: "[s]ometimes I do not receive any notifications when a new comment is posted" (S009). Moreover, S007 claimed that not all participants actively participated in the forum feedback, but only some of them: "Forum feedback is typically limited to those who actively participate in the forum, which may not represent a diverse range of perspectives or experiences".

Regarding the contents of the feedback, S005 believed that there were some participants who provided feedback without any useful information and just commented for the sake of commenting. S005 elaborated that many participants only gave criticism without offering suggestions, which would have been more useful to them (cf. S008):

> "The majority of feedback seems like someone has just skimmed quickly through what I have produced and lazely [sic] found a point (that they think is weak) to just write any criticism. People confuse feedback with criticism, and sometimes it feels like they are investigating to find 'errors' rather than to give advice" (S005).

S009 also mentioned that participants could browse the contents given by other participants in the forum, so some peers might be inclined to copy and paste the views of other peers. However, this possibility of skimming existing entries was seen as an advantage and facilitator of multi-perspectivity by some others (see section 4.5.2.1).

In turn, too many forum entries could make "the forum page […] seem chaotic and scary for the feedback-receiver" in S006's opinion: "When there are too [many] entries, it is difficult to follow everything on your forum".

Lastly, S002 and S012 stated that the forum was not easy to access. This contrasts with other participants who lauded the easy access to the forum. S002 mentioned that she was

unable to log into the OPAL forum, so she needed to send her feedback to the tutor who uploaded it on her behalf. This made the process of giving feedback very difficult. Furthermore, S012 noted the inconvenience of having to switch tabs to provide feedback:

> "A disadvantage might be that you cannot comment on the assignment directly, meaning you might have to skip between programs or tabs. For example, if students hand in written documents or PPTs, feedback producers need to skips [sic] between MS office tabs and the browser tab of the online forum. This might be inconvenient" (S012).

From the recipients' point of view, S012 remarked that downloading forum feedback was less convenient than downloading audio or video feedback for local viewing. Accessing it required a stable internet connection, which S012 elaborated as follows:

> "Also, if one want [sic] to revise their drafts using the forum feedback they need to work in a space with internet access. Other methods allow for downloading the files (e.g. audio, video, SCFB files) but forum feedback cannot really be downloaded (an option would be screenshooting but if there are multiple entries, one needs multiple screenshots which is inconvenient and confusing to work with). Forum feedback thus limits workspaces of students who enjoy working in unconventional surroundings such as their garden or a coffee shop (as many in Chemnitz do not provide wifi), as well as students who want/have to work during their commute or traveling, such as on the plane, train, tram, and bus (as wifi is often not free of charge or not always available at all)."

Altogether, we thus note partially supplementary, but also partly opposing views as far as the utilization of forum feedback is concerned. The evaluation of the usefulness of the received feedback will be tackled in the next section.

4.5.3. Evaluation of Peer Feedback in Online Forums

For the question "How useful do you consider the peer feedback that you have received in the forum?", the responses shown in Figure 8 were obtained.

A total of 12 (instead of N=13) responses were collected for this question since S002 did not present in the colloquium. Three others (S001, S004, S014) likewise did not receive forum feedback. All of them were PhD students or potential PhD students who either did not present in the course (S014) or who gave a live presentation with subsequent interactive discussion at an earlier point in time already (S001, S004). The remaining participants (N=9) who followed the regular course procedures provided ratings to this question. One participant (S013) gave a score of 2 (slightly useful), two respondents (S005, S007) selected the score 3 (somewhat useful), four participants (S006, S009, S011, S012) ticked a score of 4 (mostly useful), and two respondents (S003, S008) chose the score 5 (highly useful). Overall, two thirds (N=6) provided a positive evaluation with the score 4 or 5, while one third (N=3) assigned a score of 2 or 3.

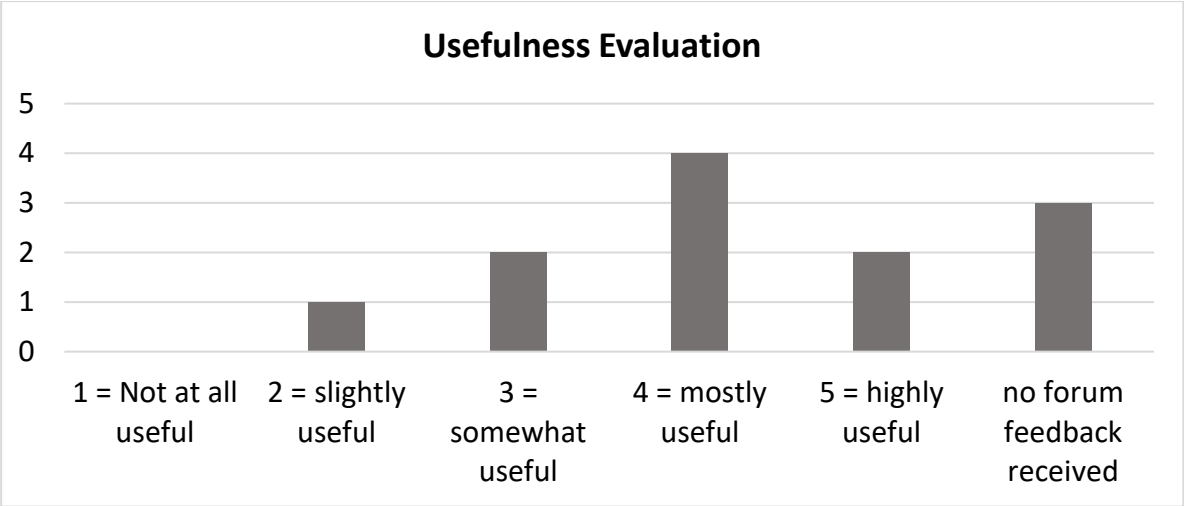


Figure 8: Usefulness of Peer Feedback in an Online Forum

The mostly positive evaluation is also mirrored in the reasons, as summarized in Table 23.

Table 23: Evaluation of Peer Feedback in Online Forums

Positive evaluation	Negative evaluation
Useful and informative	Too general/ superficial
Peer perspective	Lack of constructive feedback and criticism
Able to receive feedback from different sources	
All feedback on one page	
Brainstorming/ idea collection	
Preparation for feedback provision	
Saves time for discussions in the live sessions	

4.5.3.1. Positive Evaluations of Forum Feedback

Four of the respondents (S002, S003, S005, S012) believed that the forum feedback provided useful information and suggestions: "I think most of the responses I received were very useful! They sparked new ideas, the suggestions were helpful, helped me re-evaluate my thesis plan, encouraged me in my topic, and most of all they provided lots of food for thought" (S012); "I find this way of giving feedback is very useful and important and advice [sic] the teachers to use it in order to achieve peer-scaffolding" (S002).

Three participants stated that they favored the format of peer feedback. S002 enjoyed providing feedback, advice and assistance to her peers. S009 appreciated receiving feedback from different peers and was pleased to find that some of her fellow students had similar perspectives or topics as she had. S011 enjoyed the process of sharing contents with her peers because they were at similar stages of writing their theses and could benefit from each other. Peers extended the scope of feedback providers so that participants obtained feedback from

different perspectives and sources, not just from the instructor (S002). Feedback from multiple perspectives also helped them with brainstorming and information gathering: "Brainstorming together gives many new ideas and resources that will help in the research process" (S008).

In addition, S006 stressed that all the feedback was on one page, which was considered as very easy to view and organize: "It was easy to follow, and seeing all of the feedback entries on one single page was helpful to categorize them" (S006).

S009 mentioned that she liked the preparation and training on forum feedback before providing feedback: "There was a preparation for the feedback. We got explanation for the task beforehand. We were told to apply this feedback to our research and this was the motivation to take it seriously" (S009). This comment is noteworthy because the students received an introduction to all previous feedback methods as well, notably by means of written manuals.

Finally, S004 remarked that viewing the presentation online and providing feedback through the forum beforehand saved time for live sessions: "I have observed that offline presentations and the feedback forum have provided an efficient use of time for the live-sessions" (S004)[7].

4.5.3.2. Negative Evaluations of Forum Feedback

We also received negative comments about forum feedback. Three of the respondents (S005, S012, S013) described the feedback they received as general, superficial, and non-specific. Of these three participants, S013 assigned a rating of 2 (slightly useful), S005 a 3 (somewhat useful), and S012 a 4 (mostly useful). S005 and S012 gave mixed reviews about the feedback they received. S012 thought most of the feedback she obtained was very useful; however, some of the comments were very short and superficial. S005 indicated that he had received some useful information, whereas other feedback was "written for the sake of being written by someone who did not watch th [sic] video, evidence by people asking about something that was explicitly explained in the presentation" (S005). In fact, S005 had already contributed a similar remark in a previous feedback activity (see section 4.3.3.2).

S013, who selected the score 2, was a bit more extreme, believing that most of the feedback she received was useless: "Most of the feedback was very general and didn't help me" (S013). At the same time, S012 and S013 expressed understanding of this situation, which they felt was an inevitable part of peer feedback. More precisely, S012 believed that the quality of peer feedback depended on the willingness of the peers, on whether they were really motivated to provide the comments or just felt the need to complete the task: "It is very dependent on the

[7] Indeed, this was one of the main reasons why forum feedback was implemented at this stage in the TRC. An additional reason was the comparatively high number of participants, as it would not have been possible to schedule a live presentation session for everyone. Therefore, the inverted classroom approach was applied (see section 3.4), i.e. the students were asked to watch and comment on their peers' recorded presentations, and to seize the classroom time for the clarification of open questions concerning the research projects and the feedback comments.

time one is willing to take to provide extensive feedback and sometimes us students just get busy and want to get the task done quickly --> leading to some rather superficial feedback comments" (S012). S013 contemplated another possible reason, i.e. that other peers did not have much knowledge about the topic of her thesis. In addition, S007 felt that the feedback she obtained was all about how good her topic was, whereas she received no constructive feedback or criticism. This is probably why S007 assessed it with a rating of 3 (somewhat useful). Hence, the negative comments from participants were mainly based on peer feedback and the quality of the contents rather than deriving from the forum features.

Overall, it is interesting to note that the participants seemed to have very different attitudes towards forum feedback. On the one hand, some participants gave very positive comments. S011 even considered forum feedback to be "one of the best feedback methods for me in this semester". By contrast, some other participants, such as S013, did not like forum feedback: "In general, I am not a fan of forum feedback" (S013). It would thus be worthwhile to compare the forum feedback received by S011 and S013 to see why they have such extreme attitudes (see forum analysis in section 4.9). Apart from the actual contents of the forum entries, another potential reason for the (dis-)like could simply be personal preferences. Indeed, S013 explained in the final survey that audio feedback was her favorite method because hearing one's voice can help reduce misinterpretations (see section 4.11.3).

4.5.3.3. Participants' Recommendations for Peer Feedback in Online Forums

When asked about potential improvements or recommendations, the participants offered some advice for improving feedback exchanges in online forums. First, S009 and S012 suggested that instructors should provide guiding questions in the forum to facilitate the feedback process:

> "I think providing us students with some guiding questions would help us to 'dig deeper' when we are providing feedback. For instance, questions like: What did you perceive as positive or negative about the presentation? Was the research gap made clear? Are the research questions fitting? What would you approach differently? Do you feel like something is missing in the literature review? etc. In this way it might be easier to provide less superficial feedback as one has to really engage with the presentation in oder [sic] to provide answers to the questions" (S012).

Similarly, S005 emphasized that participants should provide informative and useful feedback, which he had stressed a few times beforehand already: "People should refrain from commenting for the sake of commenting, unless self-expression is the purpose of the specific forum topic" (S005).

Moreover, to feedback-providing peers, S001 and S007 recommended reading the comments that others had already provided in the forum before posting new comments. In contrast

to this suggestion, S014 believed that reading other people's comments before providing feedback can cause oneself to become influenced, biased or unobjective:

> "I think as a feedback producer, I was biased if other people had already posted their feedback. On [sic] one hand, it was positive, because I would read through other peoples' [sic] feedback and see things I agreed or disagreed with. On the other hand, I feel like I sometimes did not give my original feedback after having read other peoples' [sic] posts, second-guessing my own opinion. I know I could have just not read the other posts, but I was too curious to see what the others thought. I would probably try not to do this again next time" (S014).

Additionally, to make the forum exchanges more dialogic and interactive, more replies and comments on other people's posts would help to move the discussion forward (S013). Accordingly, feedback recipients should respond to the comments and encourage further feedback loops. S006 cautioned, however, that forum feedback might not be suitable in large classes: "Based on the number of feedback entries, feedback recipients might have difficulties, for instance in larger classes" (S006).

Finally, the available features of online forums should be seized to a greater extent. To exemplify, students could easily insert hyperlinks, photos, graphics, etc. into the posts. In that respect, S008 suggested that users should "funnel discussions from courses, blog posts and other places into the forums". This already points to possible combinations of feedback methods, as each seems to have different benefits. The next section will therefore summarize the results from the formative surveys before we take a close look at the actual peer feedback.

4.6. Summary of the Formative Survey Results

Even though digital board and forum feedback were evaluated differently, they had many similarities from the students' point of view: Depending on the speed of interaction (quasi-synchronous or asynchronous), both can facilitate or impede communication. Much depends on the tool settings, such as the features that have been activated by the creators (commenting, likes, new posts), and the possibility of receiving notifications about new comments. For example, S012 noted that Padlet "can become quite crowded/ unstructured, the settings need to be adjusted correctly in order to allow commenting, liking, etc." (Survey 1). As a result, some comment threads resembled interactive chats, whereas others were rarely followed up on. In addition, because written feedback is more time-consuming than verbal feedback (S012, Survey 3), some students provided brief comments only, which made the feedback seem general and unspecific.

The second disadvantage arose from the open feedback environment (Wood, 2019; see section 3.3), as it might lead to biased feedback (S013, Survey 3) or plagiarizing other people's comments (S009, Survey 4). However, the open feedback environment was also considered advantageous, as it stimulated feedback from additional perspectives (e.g. by contributing

different aspects instead of repeating points that others had already mentioned). On the other hand, recurring comments by different students can also help to reveal aspects that are in particular need of revision.

Digitally recorded feedback was perceived as very personal overall. Regardless of whether it was audio feedback, screencast feedback, or combined screencast feedback (with speaker image), personalization was always a benefit that was cited by the participants. The oral modality allowed them to share more information and express themselves more clearly than in writing: "It is similar to voice messages, where I can randomly talk to my friend asynchronously. There is no pressure from the academic profession, so I can give feedback for at least 3 minutes straight" (S001, Survey 2). Voice also seemed to create a better emotional connection between feedback providers and receivers, whereas with written feedback, "the feedback producer cannot include social clues" (S012, Survey 3).

Screencasting might compensate for several disadvantages of audio feedback, such as difficulties in finding the text passages to which the feedback provider is referring; the inability to understand unfamiliar terms and abbreviations; and comprehension challenges resulting from pronunciation problems or poor sound quality. Despite its many advantages over written feedback, screencast production demands greater time investments (Survey 3: S006, S011, S012), effort, technical expertise (Survey 2: S014; Survey 3: S012) and access to a suitable recording environment (Survey 2: S011; Survey 3: S012). For recipients, it turns out to be challenging because they are unable to quickly skim the contents or directly extract segments into a Word document for reasons of note-taking and revision (Survey 3: S012). Thus, localization might be a disadvantage of recorded feedback that could be compensated for by combining it with cloud editors (Wood, 2019).

While the previous sections have provided insights into participants' perceptions of the different digital feedback methods, the next sections will expound the results from the qualitative content analyses of the actual peer feedback that they produced. Subsequently, the findings from the different data sources will be triangulated and jointly discussed.

4.7. Results from the Feedback Analysis on Digital Boards

This section will report on the analytical results of the feedback and the author's responses that were provided on digital boards during the phase of idea generation. Beforehand, some introductory remarks will be shared about the data sets and their anonymization.

First, each digital board was downloaded in two ways: once as a picture file and once as a PDF. The image depicted the boards in color with the exact layout that was visible to the visitors of the boards. The PDF, in turn, displayed the boards in a simpler manner, showing the written comments as text, which thus facilitated coding and lexical searches in MAXQDA. Next, as part of the anonymization process, each participant was assigned a particular student code and color for easier recognition. For example, S003 was colored red in the post title. No coloring

was employed in the text comments themselves, though, for better readability. The lecturer's name (J. Schluer) was not anonymized for the analysis. Even though teacher feedback is visible on the screenshots of the digital boards, readers should note that it was posted only after the peers had contributed their comments.

The data set consisted of digital boards created by N=8 Master and 5 (thereof 3 prospective) doctoral students as well as one postdoctoral researcher, equaling one board per person. Then, they commented on each other's topic ideas that were presented on the boards. Afterwards, it was possible for the peers to respond and interact further, either on the Padlet or in another way. It should be remarked, though, that the postdoctoral researcher (S015) only received comments, but did not provide any feedback to others on the Padlets. Also, he did not take part in the survey that inquired about the participants' experience with cloud applications (see section 4.3). Therefore, his data only served to supplement the analysis of the Padlets with regard to the board settings and the feedback that he had obtained.

Furthermore, it needs to be noted that N=13 out of 14 digital boards were created on Padlet, whereas N=1 (S006) was crafted on Jamboard. However, due to the similarity of features and for easier reference, the digital board on Jamboard will be subsumed under the term "Padlet" in the presentation of findings, unless unique features require further specification. In fact, differences were only observed for the first analytical category, the "Board Settings", that will be described in the respective section (section 4.7.2).

4.7.1. Overview of Digital Boards and Codings

This section serves to give a general overview of the participants in the digital board activity, their usefulness evaluation of the peer feedback received, and the category system that was created during the analysis.

Table 24: Overview of Digital Boards in the Document System with Document Memos and Total Codings

Board	Academic status	Document memo	Total codings
S001	PhD student	"not at all useful" (red)	153
S002	(prospective) PhD student	"highly useful" (green)	208
S003	(prospective) PhD student	"highly useful" (green)	140
S004	PhD student	"highly useful" (green)	176
S005	MA student	"slightly useful" (orange)	299
S006	MA student	"highly useful" (green)	191
S007	MA student	"mostly useful" (purple)	149
S008	MA student	"highly useful" (green)	191
S009	MA student	"mostly useful" (purple)	251

Board	Academic status	Document memo	Total codings
S011	MA student	“highly useful” (green)	367
S012	MA student	“highly useful” (green)	325
S013	MA student	“mostly useful” (purple)	193
S014	(prospective) PhD student	“mostly useful” (purple)	268
S015	Postdoc	“not available” (yellow)	112
14			**3,023**

As can be seen in Table 24, N=8 Master students, N=2 registered PhD students, N=3 prospective PhD candidates and N=1 Postdoc participated in the Padlet activity. This yielded a total number of 3,023 codings. The colors in the “Document Memo” column represent the results from the recipients’ usefulness evaluation of the peer feedback, as obtained from Survey 1 (see section 4.3.3). Altogether, 7 authors (S002, S003, S004, S006, S008, S011, S012) gave the highest score 5 (“highly useful”, i.e. green) for the usefulness of the feedback obtained on the digital board. 4 authors (S007, S009, S013, S014) rated it as 4 (“mostly useful”, i.e. purple); 1 author (S005) ranked it as 2 (“slightly useful”, i.e. orange), and 1 author (S001) assessed it as 1 (“not at all useful”, i.e. red). For an immediate overview, readers may likewise consult Table 25.

Table 25: Overview of Usefulness ratings from Survey 1

Color	Evaluation of received feedback	Number of participants	Boards
	“highly useful”	7	S002, S003, S004, S006, S008, S011, S012
	“mostly useful”	4	S007, S009, S013, S014
	“slightly useful”	1	S005
	“not at all useful”	1	S001
	did not take part in the survey	1	S015

Overall, there was a total of 3,023 codings for the 14 digital boards, which equals an average of M=216 codings per board with a standard deviation of 75.44. With 367 coded segments, **S011 was the Padlet that contained most codings**. It also had the most coded segments of text comments (N=19), comments without a greeting (N=15), negative feedback (N=35 instances), topic-related feedback (N=17), feedback for reflection (N=18), the pronoun “you” (N=49 in total), and linguistic hedges (N=45 instances in total).

On the contrary, the outlier **S015 was the Padlet that was coded least**, with only 112 segments in total. This most likely results from the fact that his Padlet was submitted late, which thus led to a low number of comments. Moreover, S015 did not reply to any of the comments that were offered, which further reduced the number of possible codings. On the second-lowest

rank, we find S001. While she received feedback from their peers, she was not satisfied with it (see Table 25), as it did not address the specific questions that she had posed (see section 4.3.3.2).

Generally, the 3,023 codings were distributed across the major analytical categories as follows (Figure 9):

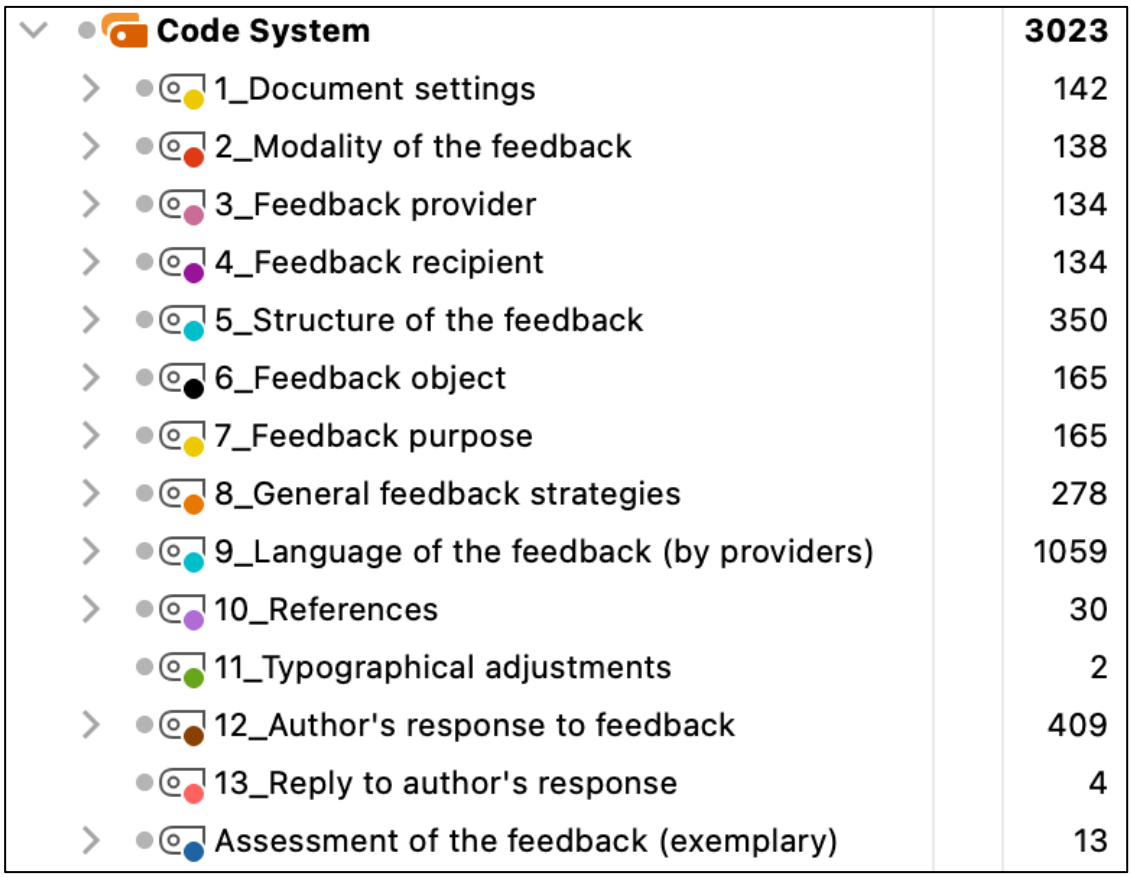


Figure 9: The Main Categories in the Code System from the Digital Board Analysis

The final category, "Assessment of the feedback", was analyzed in an exemplary, i.e. non-exhaustive, manner and has therefore been left unnumbered in Figure 9. The definitions of all main categories are provided in Table 26.

Table 26: Main Categories and Definitions Used for the Analysis of Feedback on Digital Boards

Category	Description
01_Document/ board settings	Layout settings and commenting features enabled by the board author and/or utilized by the feedback provider
02_Modality of the feedback	Commenting as text, audio, visuals or hyperlinks
03_Feedback provider	Person posting reactions or comments in order to give feedback and advice to the board author
04_Feedback recipient	Person to whom the feedback is addressed (usually the board author)

Category	Description
05_Structure of the feedback	Structural make-up, i.e. main elements of the feedback post (e.g. introduction, body, conclusion)
06_Feedback object	Content area or assessment dimension on which feedback is given (e.g. topic choice, language use)
07_Feedback purpose	The feedback function or likely intention behind the given feedback (e.g. to motivate, correct or inspire)
08_General feedback strategies/ Valence	Positive comments or negative feedback (criticism), e.g. outlining strengths and errors/ areas for improvement (with varying degrees of detail)
09_Language of the feedback (by providers)	Feedback provider's language use or linguistic strategies (e.g. utilization of hedges/ boosters, pronouns, sentence types)
10_References	Mentioning sources, referring to own knowledge or communication in or outside of the digital board
11_Typographical adjustments	Textual visual strategy to attract or direct attention (e.g. use of bold print or capitalization of words or word parts)
12_Author's response to feedback	Recipient's reply to the feedback and its structural composition as well as linguistic characteristics
13_Reply to author's response	Follow-up communication to feedback recipients' comments, questions or reactions
Assessment of the feedback (exemplary)	Researchers' sample analysis of outstanding feedback, such as very direct, vague or impersonal comments

The following section will present the results in the order of the thirteen main categories.

4.7.2. Document/ Board Settings

Tool affordances play a primordial role in shaping effective feedback exchanges (cf. e.g. Nieminen et al., 2022, p. 101; section 2.1). While applications often offer numerous features, users might not be aware of them or lack knowledge and skills to implement them strategically (see also survey results). Therefore, it is important to describe the possible tool functions and to examine the ways in which they are used (or not) for solving particular tasks, including feedback requests, feedback provision, and feedback use.

Moreover, it needs to be considered that tool features change over time, i.e. with new functions being added or removed (cf. e.g. Schluer, 2022a, p. 240). Consequently, it is crucial to check the scope of functions regularly and to familiarize learners with them as needed for the task. For instance, during the exploratory research conducted in this study, Padlet launched new features that were absent when the course was designed. This included the possibility of directly recording the voice or screen as well as following a Padlet to receive notifications about new posts. These features can enhance digital feedback exchanges in the future and will

therefore be incorporated in future implementations of the TESOL Research Colloquium and other courses (see section 5.7.2). The following presentation will thus center on the features that were available at the time of designing and conducting the current course. Mostly, these constitute basic features that are also available in similar applications, such as Jamboard, TaskCards, or Miro. Some others, however, appear to be distinct features of Padlet that might not (yet) be offered by other tools. That said, we will turn to the findings that were obtained.

The category "Document/board settings" deals with the layout or design of the digital boards. Each author was free to choose the layout on their own. They could decide whether their posts should be fixed or flexible, in which order comments should appear, whether new posts can be added by others, whether the commenting was anonymous or not, whether commenting on individual posts was allowed or only the insertion of new posts, whether a like/rate function was included, and whether initial posts (regarding their topic) were colored and new posts (comments) could be colored by other contributors or not. An overview of all codings pertaining to the board settings is given in Table 27.

Table 27: Overview of Digital Board Settings

Settings	N	Digital boards
Structure		
Fixed structure (posts cannot be moved)		
• Table format	6	S002, S003, S008, S012, S013, S015
• Reverse chronological order	4	S001, S007, S011, S015
• Other fixed structure	1	S009
Flexible structure		
• Posts can be moved freely	3	S004, S006, S014
• Posts can be moved to a limited degree	1	S005
Adding new posts		
• Possible	12	S001, S002, S003, S004, S005, S006, S007, S008, S009, S011, S014, S015
• Not possible	2	S012, S013
Commenting on individual posts		
• Possible	9	S001, S002, S003, S004, S007, S011, S012, S013, S014
• Not possible	5	S005, S006, S008, S009, S015
Like/rate		
• Possible	8	S001, S002, S003, S007, S011, S012, S013, S014
• Not possible	6	S004, S005, S006, S008, S009, S015
Color of posts		
Colored		

Settings	N	Digital boards
• Colored by author		
- Initial post (regarding their topic)	7	S001, S003, S006, S008, S012, S014
- Reply to comment	5	S002, S008 (4x)
• Colored by feedback provider		
- Peer	11	S004, S005 (2x), S006 (3x), S007, S011, S014, S015 (2x)
- Teacher	8	S003, S005, S006, S008, S009, S011, S014, S015
Not colored		
• Not colored by author		
- Initial post (regarding their topic)	9	S002, S003 (2x), S004, S005, S007, S009, S011, S013
- Reply to comment	0	
• Not colored by feedback provider		
- Peer	44	S001, S002, S003, S004 (4x), S005 (7x), S006 (5x), S007, S008 (5x), S009 (11x), S014 (5x), S015 (2x)
- Teacher	1	S006

Most of the authors chose a fixed structure (11 boards) of which N=6 were in table format, N=4 in reverse chronological order as well as N=1 in another type of fixed structure. In turn, 4 boards had a flexible structure, which means that their posts can be moved either freely (N=3) or at least to a limited degree (N=1). 12 boards included the possibility of adding new posts, 2 did not have this option. On N=9 boards, commenting on individual posts was possible, in N=5 it was not. N=8 Padlets offered the possibility to like or rate a comment/post, while N=6 did not. Interestingly, 8 out of the 9 Padlets that permitted commenting on individual posts (with the exception of S004) incorporated a like/rate function as well. By contrast, S004's board only comprised a comment function. In 7 cases, the authors colored their initial posts whereas in 9 cases, they did not. By contrast, peers commented N=44 times without using a color for their post. In 11 instances, they used a color, of which 5 colored posts came from the same student (S009). When the authors replied to the peer comments, two of them colored their posts (once by S002 and N=4 by S008). Finally, the teacher used colored posts strategically (yellow; N=8). On Jamboard, this once coincided with the default color (yellow), but once it did not (green).

Below are some examples of **fixed structures**, starting with the **table format** in Figure 10.[8]

[8] Note that the screenshots of the digital boards only serve to give a rough impression of their layout and structures, so their contents do not need to be readable here.

Figure 10: Padlet of S012 with Multiple Columns (One per Topic) and Commenting Options (Excerpt)

S012 created a Padlet with four fixed columns placed next to each other, each of which can be commented on and liked. Each column was devoted to a different topic idea (see Figure 10).

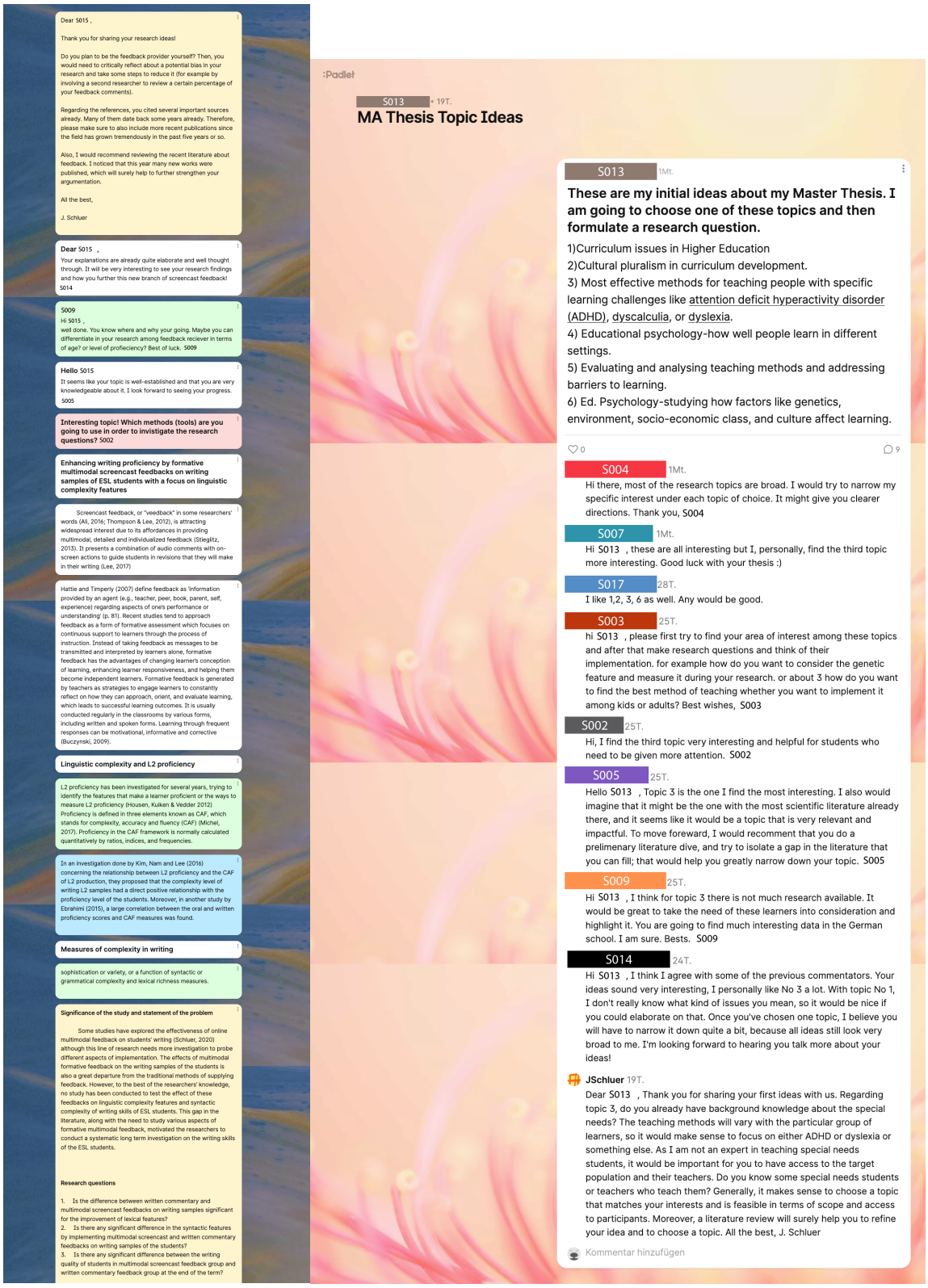


Figure 11: Padlet of S015 (Left-Hand Side) and S013 (Right-Hand Side) in Single-Column Format for One or Several Topics

S015, by contrast, focused on only one topic from the outset and chose a single table column (or "list" format) to which posts can be added in reverse chronological order (left-hand side of Figure 11). Direct commenting (and responding) to individual posts was not enabled, neither was liking. This could have hampered the feedback exchange. Finally, S013 used the single-column design for discussing six (broad) topic suggestions, as can be seen on the right-hand side in Figure 11. This setting might not be conducive to discussing specific ideas, as referencing was impeded. Accordingly, the quality of the comments and their usability might have been affected adversely. In survey 1 (see Table 24), S013 rated the usefulness of the feedback as "mostly useful", whereas S012 considered it as "highly useful". However, to draw reliable conclusions from this, further data would be needed.

The same applies to other board settings. For instance, another variant was a reverse chronological order in which the newest post was automatically placed on the left-hand side. In contrast to the list format, the posts stretched across the entire screen. Through commenting and liking, however, references to specific posts were enabled (e.g. S007, S011). Changing the order of individual posts was not possible, though, in these fixed design structures. By contrast, 4 authors decided to create Padlets in which the **structure was flexible**. In one case (S005), it was possible to move the posts **within the different columns**. When moving a post, the others were moved as well, though. In the 3 remaining ones, the posts could be moved freely on the board. Likewise, it was possible to add new posts anywhere on the Padlet. Additionally, the use of arrows allowed for making connections between individual posts, as shown in Figure 12.

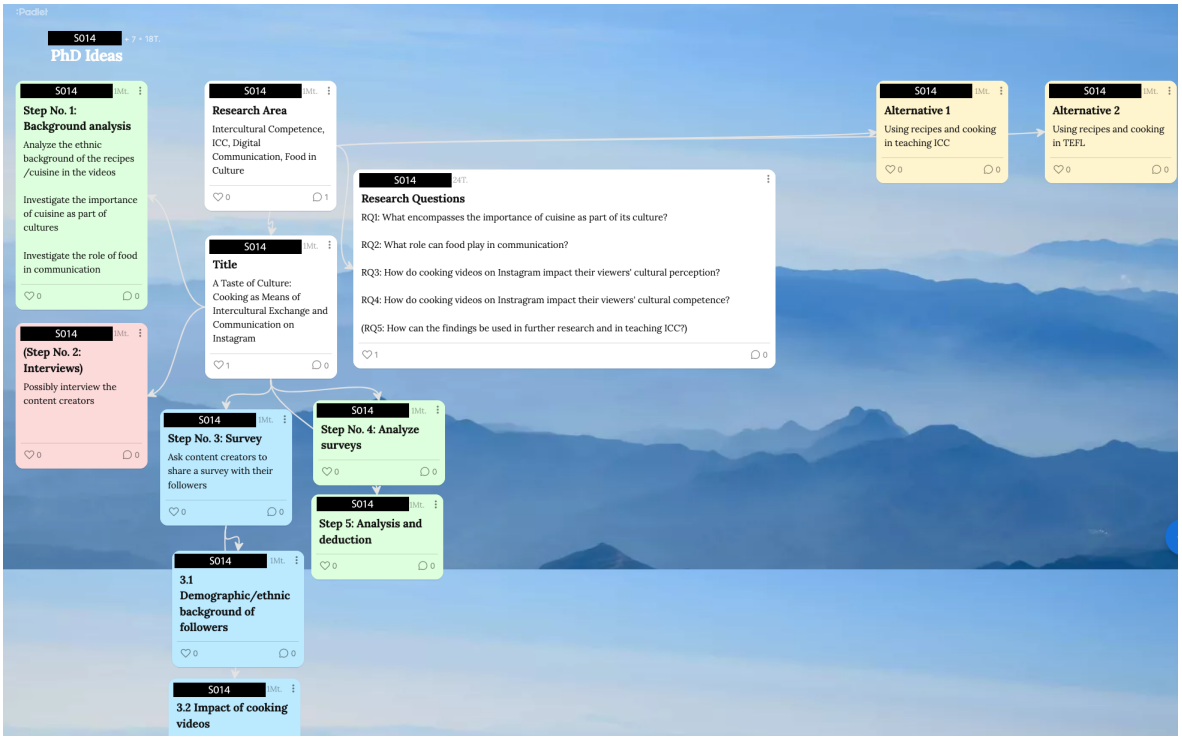


Figure 12: Padlet of S014 (Excerpt)

The application Jamboard, which was chosen by S006, likewise allowed for free movements of the posts. Here, however, the posts were limited in characters, which made it necessary for some contributors to split a comment into several posts. Some peers indicated the connection between their posts by enumerating them, others did not (see Figure 13).

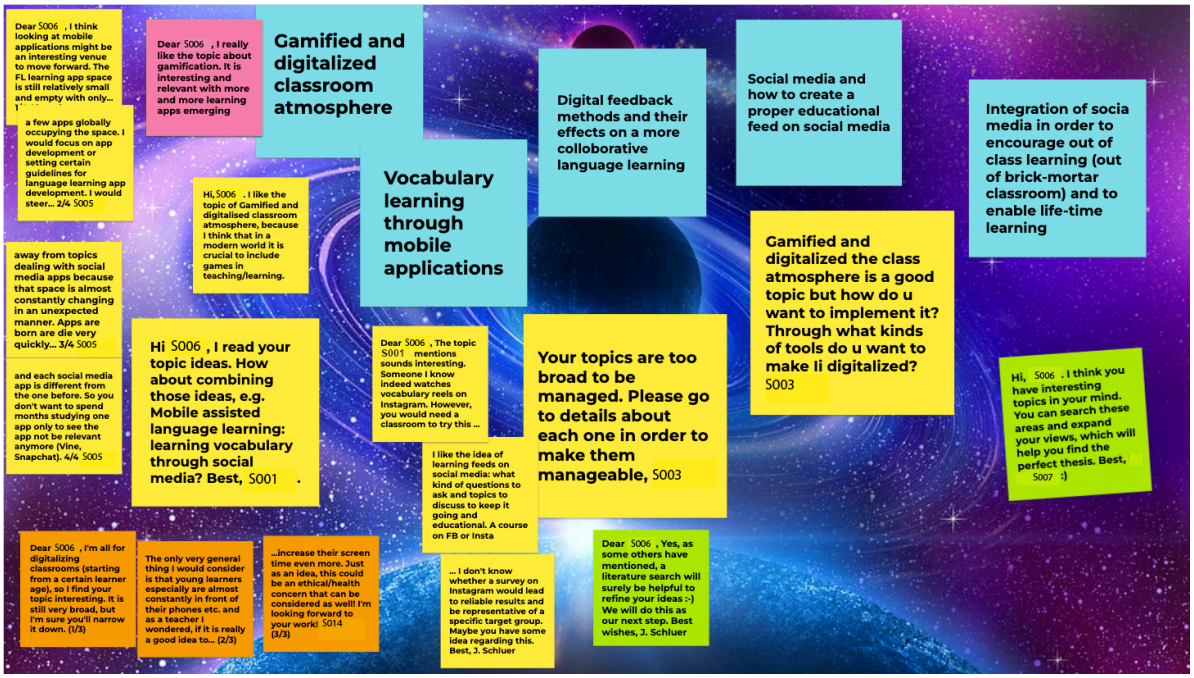


Figure 13: S006's Jamboard

In several of the Padlets shown so far, coloring stood out as another possible feature. N=7 Padlet authors used colors for their initial posts, e.g. to differentiate between different ideas in separate columns, as S012 did. Two used it to mark their replies to the peer comments (S002 and S008). Several feedback givers (N=7) also utilized colors for their posts. In future research, it would be interesting to learn whether there was a particular reason for using one color instead of another. Maybe they used it due to personal preferences, or to distinguish between different topics, or to identify themselves, or without any special reason. As far as my own perspective as the feedback-providing teacher is concerned, I tried to consistently use the same color (yellow) for my comments to allow for easier recognition. Sometimes, however, a change of color was not possible due to the formatting restrictions that were set by the Padlet author. For future implementations, some guidance about these basic features and their possible use would be helpful to optimize feedback procedures on digital boards (see discussion section).

4.7.3. Feedback Modes

In its current version, Padlet allows for text, voice and (screenrecorded) video comments as well as gestural feedback via thumbs-up/ thumbs-down votes, likes, and many more. In addition, commenting is possible via file uploads and hyperlinks (e.g. to websites or cloud documents)

(Schluer, 2022a, p. 98). In the implementation reported here (winter term 2022/23), some of these features were not yet available or had been introduced only recently so that the participants might not have been aware of them. In future seminars, students' attention could be drawn more explicitly to this variety of commenting options on digital boards. In the analyzed Padlets, however, mostly text comments had been inserted plus some occasional website links. Voice and screen-recording had not yet been employed as feedback methods at this stage.

More precisely, on the 14 boards that were investigated, a total of 134 text comments and N=4 hyperlinks to websites were detected. Interestingly, three out of the four **hyperlinks to websites** were given by doctoral students and only one by a Master student (S013 to S012). Two examples are displayed in Figure 14 and Figure 15. While the post in Figure 14 also included the cover image and a content preview as an interactive element, Figure 15 only contained the link address as text.

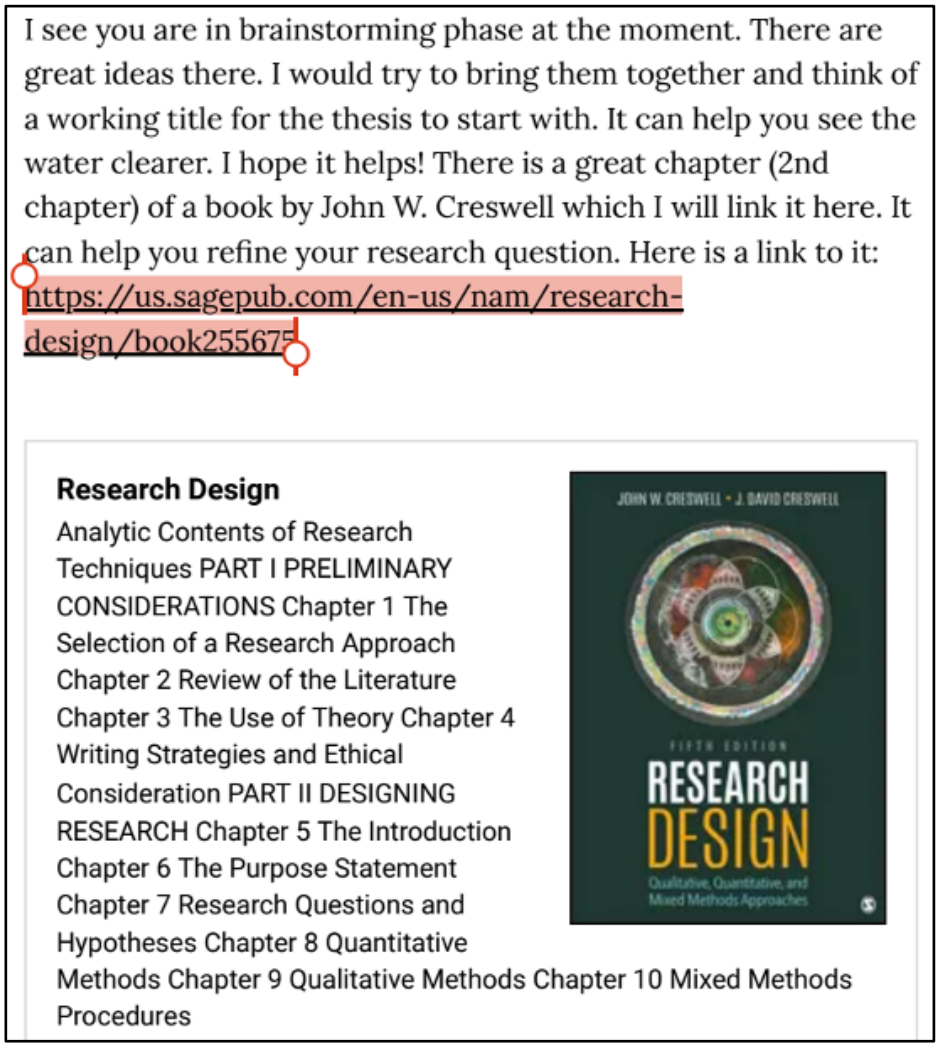


Figure 14: Comment by S004 (PhD Student) to S007 (MA Student)

> *What do you specifically refer by communication skills? I have done an action research on communication strategies. It is actually a very interesting, but a comprehensive topic. Dörneyi has some articles published on it. Here is one: http://bluefieldcomp.pbworks.com/w/file/fetch/112596109/On%20the%20Teachability%20of%20Communication%20Strategies.pdf*

Figure 15: Comment by S004 (PhD Student) to S002 (Prospective PhD Student)

With regard to the number of text comments, the average was M=9.6 per board, with the variance shown in Figure 16.

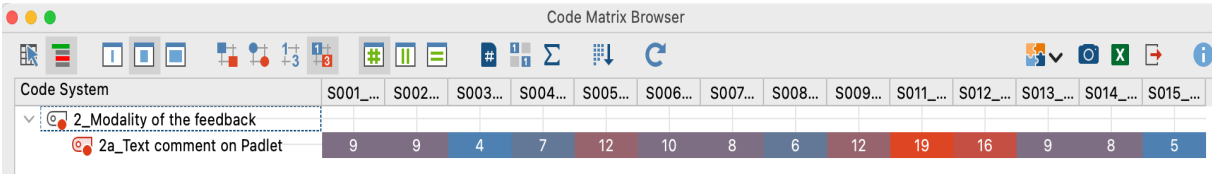


Figure 16: Code Matrix Browser of Text Comments on Digital Boards

With almost twice as many as the average, S011's Padlet contained the most **text comments** (N=19) and was rated as "highly useful" by the author in survey 1 (see section 4.3.3). This was followed by S012 (N=16), S005 and S009 (N=12 each) as well as S006 (N=19). The digital boards that received the least text comments were S003 (N=4), S015 (N=5) and S008 (N=6).

Apart from the number of comments, their average length as measured in character count is worth considering. This was done with the help of MAXQDA's "Code Coverage" function that allows for analyzing the number of characters in the coded segments, as depicted in Table 28.

Table 28: Overview of Digital Boards with Number and Characters Counts of the Text Comments

Padlet	Text comments	Total characters of text comments	Average characters per text comment	Document memo for recipients' evaluation
S001	9	1,855	206.11	"not at all useful"
S002	9	1,748	194.22	"highly useful"
S003	4	2,308	577.00	"highly useful"
S004	7	1,759	251.29	"highly useful"
S005	12	3,296	274.67	"slightly useful"
S006	10	2,948	294.80	"highly useful"
S007	8	1,964	245.50	"mostly useful"
S008	6	2,779	463.17	"highly useful"
S009	12	4,004	333.67	"mostly useful"

Padlet	Text comments	Total characters of text comments	Average characters per text comment	Document memo for recipients' evaluation
S011	19	4,663	245.42	"highly useful"
S012	16	5,881	367.56	"highly useful"
S013	9	2,911	323.44	"mostly useful"
S014	8	3,502	437.75	"mostly useful"
S015	5	1,491	298.20	"not available"
TOTAL	**134**	**41,109**	**306.78**	

As can be seen in Table 28, S012 was the board with the most characters occurring in 16 text comments (5,881 characters), whereas S015 had the least characters (1,491) in 5 text comments.

On average, the text comments contained M=306.78 characters. In 6 Padlets (S003, S008, S009, S012, S013, S014), the average number of characters per text comment was higher than the total average of all text comments (M=306.78). All these were either rated as "highly useful" (green document memo) or "mostly useful" (violet document memo) by the feedback recipients in survey 1 (see section 4.3.3). However, neither the length of the comments nor the number of comments appeared to provide definite reasons for the recipients' evaluation of the usefulness. They will therefore be inspected in more detail later on (see section 4.7.16).

4.7.4. Feedback Providers

The feedback providers can be categorized into peers, teacher, and anonymous contributors. For peers, further distinctions were made, as shown in Figure 17: same-level peer (doctoral or Master student), higher-level peer (doctoral to Master) and lower-level peer (Master to doctoral or postdoctoral). Since the postdoctoral researcher did not provide any comments, he never was the source of feedback, but only a recipient.

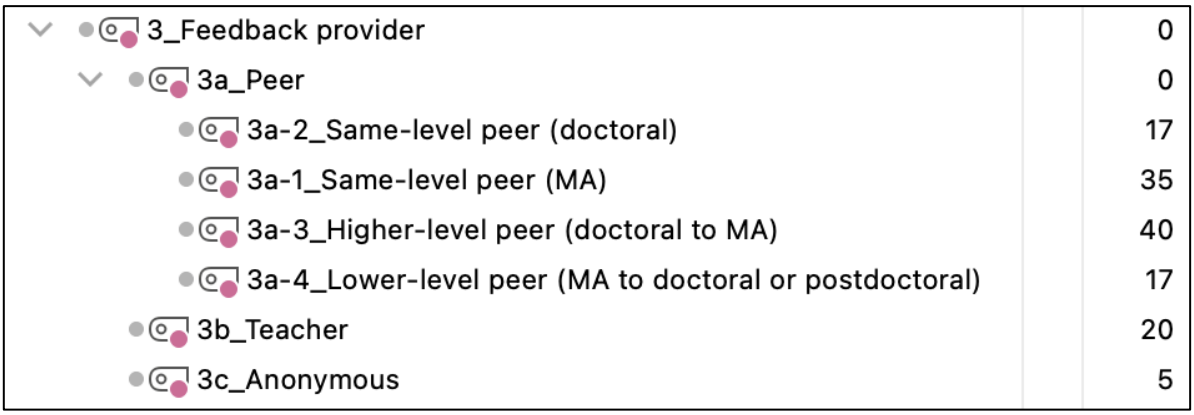


Figure 17: Overview of Codings for Feedback Providers on Digital Boards

With a total of 40 comments, higher-level peers (doctoral to Master) provided feedback the most in absolute numbers and on average (M=8 comments per person). This was followed by 35 comments by same-level peers (MA), averaging M=4.38 comments per feedback producer. By contrast, doctoral students only offered 17 comments to their same-level peers with 3.4 comments per person. Likewise, 17 comments were made by lower-level peers (Master to doctoral or postdoctoral), which only averaged M=2.13 comments per person, though, as summarized in Table 29.

Table 29: Comments made by Feedback Providers on Digital Boards in Total and on Average

Category	Number of persons	Total number of comments	Average comments by person
Same-level peer (doctoral)	5	17	3.4
Same-level peer (Master)	8	35	4.38
Higher-level peer (doctoral to Master)	5	40	8.0
Lower-level peer (Master to doctoral or postdoctoral)	8	17	2.13

Additionally, N=5 feedback providers remained anonymous (which was partly caused by the board settings, see section 4.7.2). Lastly, 20 comments were provided by the teacher. The detailed overview is given in Table 30.

Table 30: Code Matrix of Digital Board Comments by Feedback Provider

	Peer feedback				Teacher feedback	Anonymous feedback	SUM
	Same level (Doctoral)	Same level (Master)	Higher level (Doctoral to Master)	Lower level (Master to doctoral or postdoctoral)			
S001	4			4	1		**9**
S002	4			4	1		**9**
S003	2			1	1		**4**
S004	1	1		3	1	1	**7**
S005		5	5		1	1	**12**
S006		2	4		2	2	**10**
S007		3	5				**8**
S008		2	3		1		**6**
S009		5	5		1	1	**12**
S011		8	7		4		**19**

	Peer feedback				Teacher feedback	Anonymous feedback	SUM
	Same level (Doctoral)	Same level (Master)	Higher level (Doctoral to Master)	Lower level (Master to doctoral or postdoctoral)			
S012		5	7		4		**16**
S013		4	4		1		**9**
S014	4			3	1		**8**
S015	2			2	1		**5**
SUM	**17**	**35**	**40**	**17**	**20**	**5**	**134**

Most feedback relating to the above categories (same-level peers, higher-level peers, and teacher) was given to S011 with 8 comments by same-level peers (Master). Furthermore, higher-level peers (doctoral to Master) offered most feedback to S011 and S012 (7 each). Same-level peers and lower-level peers gave most comments to S001 and S002 (4 each). The teacher provided most comments to S011 and S012 as well (4 each). Most likely, this resulted from the variety of topic ideas spread across different columns, which might have encouraged commenting on each of the different themes. Lastly, anonymous feedback was offered mostly to S006 (N=2). The sheer number of comments, however, does not give clues about their quality and length. Therefore, the nature of the feedback will be inspected in further detail below.

4.7.5. Feedback Recipients

In each of the 134 text comments, the original board author was the person to whom the feedback was addressed (feedback recipient). Thus, there was no direct communication between different feedback providers on a Padlet. However, there were several cases of indirect communication when references to communication within and beyond the board (in real life interactions) were made. These will be examined in section 4.7.11 (“References”). Moreover, there sometimes was feedback on the feedback received (for details see section 4.7.13 “Author’s responses to feedback”).

4.7.6. Structure of the Feedback

During the analysis, the feedback given in the 134 text comments was structured into greeting, main part/actual feedback, and goodbye. The greeting was further subdivided into greeting by using name, general greeting, or no greeting, as synthesized in Figure 18. Among the 134 coded feedback sequences, 88 included a greeting, while 46 did not; 80 comments started with a greeting by using the name and 8 with a general greeting (“Hi”). Finally, 82 comments ended with a goodbye, whereas 52 did not include any form of goodbye.

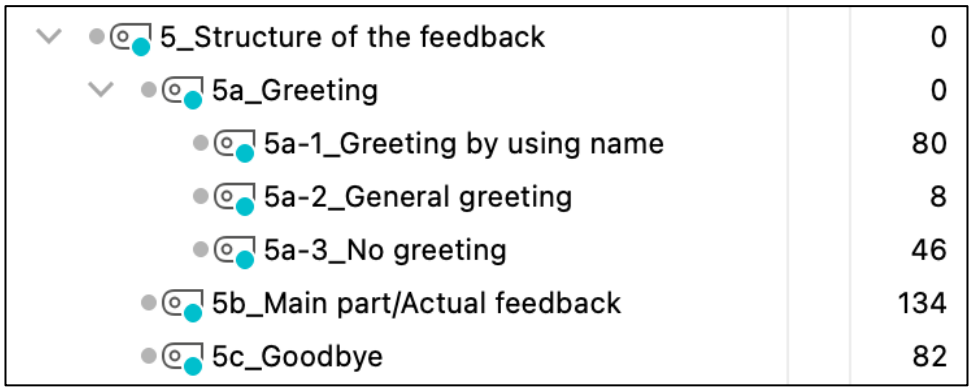


Figure 18: Codings of Structure of the Feedback on Digital Boards

The main part of the feedback units will be analyzed in the next section, dealing with the feedback content.

4.7.7. Feedback Objects/ Contents (Assessment Criteria)

Overall, nine different feedback objects, i.e. aspects to which feedback is provided, were identified in the digital board data. Most feedback was given on topic-related aspects (N=95 instances) and on the research method (N=41). There was also feedback on the purpose/significance of the study (N=9), the research questions (N=8), literature/sources (N=8), findings (N=4), participation (N=1)[9], language (N=2) and originality (N=1).

To see whether some comments addressed several different objects, their code relations were investigated. It was found that in N=9 comments, several feedback objects were discussed, seven of which included topic-related feedback. Such an example is shown in Figure 19, with the different colors representing distinct but interrelated types of feedback content. More precisely, red stands for topic-related feedback, green for feedback on literature/sources and yellow for purpose/significance.

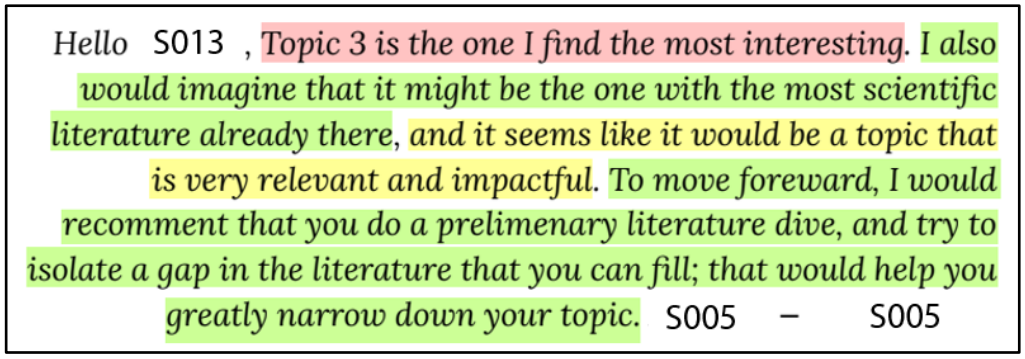


Figure 19: Padlet Comment by S005 to S013

[9] Here, "participation" means that the feedback provider offered additional help related to the author's further progress. Interestingly, this was the only occurrence of such help found on the digital boards.

The feedback content is closely related to feedback purpose, which will be examined next.

4.7.8. Feedback Purpose

Overall, three major feedback purposes were identified in the board comments: reflection/inspiration, motivation and correction (in descending order; see Figure 20).

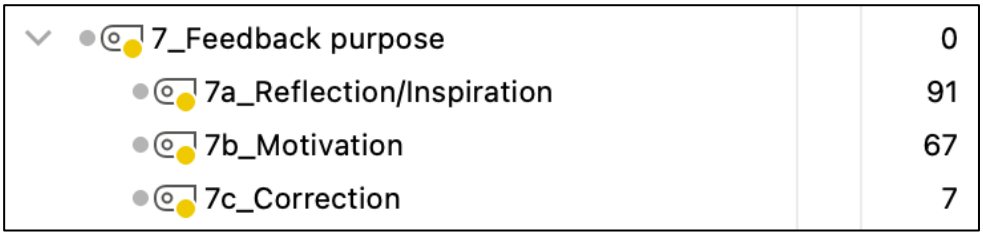


Figure 20: Codings of Feedback Purposes on Digital Boards

Sometimes, several comment types occurred together in one post, such as in Figure 21, where the Master student S017[10] gave feedback for reflection/inspiration (marked in yellow) at the beginning and at the end, while providing a correction in the middle (coded in red).

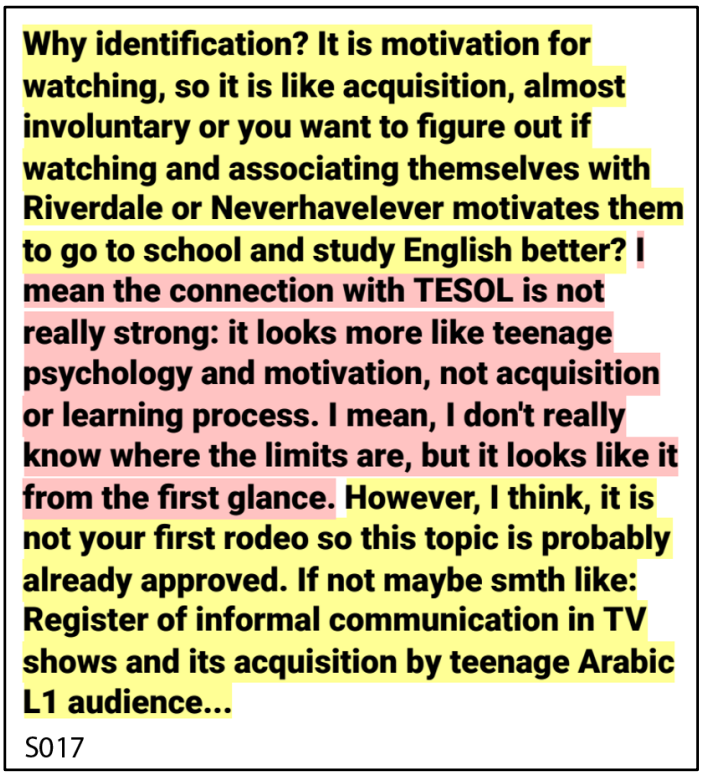


Figure 21: Padlet Comment by S017 to S005

In that case, different feedback purposes occurred sequentially within one post, whereas in five others, they even surfaced simultaneously for the same coded segment: in N=4 comments (all

[10] S017 quit the seminar after the Padlet activity. Thus, further data are not available from her for subsequent analyses.

given in S012), reflection/inspiration was combined with motivation; and N=1 (given in S008) comment included motivation and correction.

4.7.9. Positive and Negative Feedback

The provided feedback was categorized as either positive or negative, and specific or non-specific. Additionally, a category was reserved for feedback that had an unclear tendency, i.e. could not be clearly assigned to one of the other codes (see Figure 22).

Positive feedback refers to comments outlining strengths, whereas negative feedback highlights errors or areas for improvement. As the name implies, specific feedback usually contains a specification (what was good or wrong), often along with explanations (why it was good or wrong) and optionally recommendations for further improvement (what could be done in order to improve) (cf. Nelson & Schunn, 2009, p. 378). Non-specific feedback, by contrast, refers to general comments, such as “Well done” or “Wrong” (cf. Voerman et al., 2012, p. 1109).

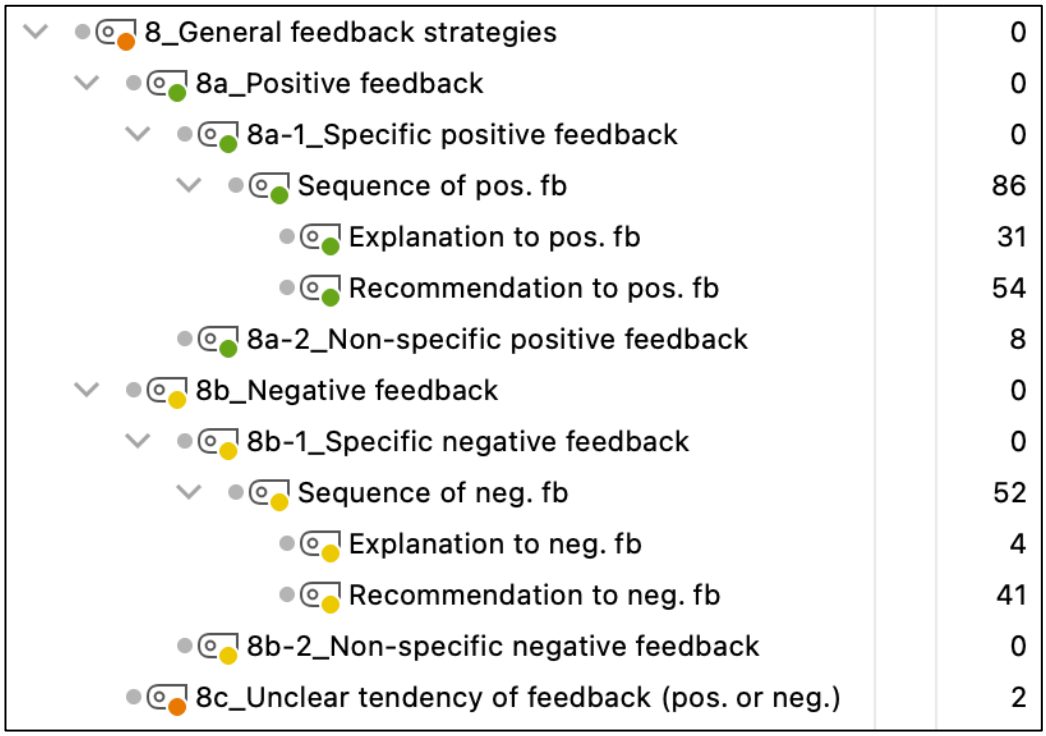


Figure 22: Overview of Codings for Positive and Negative Feedback on Padlet

With a total of 94 sequences of both specific (N=86) and non-specific (N=8) instances, positive feedback was given nearly twice as often as negative feedback (N=52 sequences). On average, there were M=6.7 sequences of both specific and non-specific positive and M=3.7 segments of specific negative feedback per Padlet. Of the 86 sequences of specific positive feedback, there were N=31 segments with explanations and N=54 recommendations. Hence, even for positive aspects, nearly three thirds (62.8%) of all comments contained further suggestions for improvement (see example by S002 below). Additionally, N=31 explanations were detected in the

positive feedback passages. Moreover, it is remarkable that all sequences of negative feedback (N=52) were specific instead of unspecific. Most of them (N=41, i.e. 78.8%) also comprised recommendations for revision and improvement. A few of them (N=4) included explanations about the requested correction.

To illustrate the ways in which recommendations were given in positive and negative feedback sequences, two examples from the same Padlet (S009) are cited below:

> "Dear S009, it is a very interesting topic. In my opinion, you have to decide if it is going to be a digital classroom or face to face classroom in order to decide what to use (digital tools or non-digital games in the classroom). you can use non-digital games in the classroom and digital (online) ones for the activities at home. After that, investigate the motivation for both methods via surveys. Good luck! S002" (Padlet Comment by S002 to S009)

> "Hi S009, That's an interesting topic you're working on! I really like the idea of investigating the use of games in the EFL classroom. Anyhow, I agree with some of the previous comments that the research direction doesn't sound quite clear yet. Rephrasing the first RQ and including a connection between RQ1 and RQ2 could be incredibly helpful. Why don't learners want to speak English in the classroom? What needs must be fulfilled for them to speak English and use new vocabulary? What games are there for teaching vocabulary in general? Which of these games are most appreciated by learners? How can they be used to increase motivation to speak and elicit the use of new vocab? Those are very broad ideas, but maybe they can help you narrow down your research topic a bit :) Best wishes and thank you for sharing, S014" (Padlet Comment by S014 to S009)

In the specific positive feedback given to S009, S002 first expressed her positive attitude towards the topic ("it is a very interesting topic") before providing suggestions for clarification concerning the classroom context and highlighting its implications for choosing digital or non-digital games. Similarly, S014 began her comment with almost the same phrase ("That's an interesting topic you're working on!"), supplemented by an elaboration. Subsequently, though, S014 continued with negative feedback, building on other peers' comments and providing suggestions for improving the research questions. Additionally, S014 posed several questions to encourage reflection, hoping that these might be helpful to S009 for "narrow[ing] down your research topic a bit".

In terms of non-specific positive feedback, the following two quotes serve as examples:

> "I guess this topic is already approved and needs no comments:) S017" (Padlet Comment by S017 to S001)

> "Hello S001! Great to see that you're still actively working strong on your thesis! As always, if there is anything I can contribute, I would be more than happy to :D S005" (Padlet Comment by S005 to S001)

Here, S001 received appreciative comments regarding her topic choice and perseverance, yet without any specific advice on content-related aspects. Indeed, in her survey responses, S001 expressed her dissatisfaction with these general remarks, as they did not help her move forward (see section 4.3.3.2).

Beyond these analyses, the distribution of the feedback types was examined across all boards, as shown in the Code Matrix in Table 31.

Table 31: Code Matrix of Specific and Non-Specific Positive and Negative Feedback per Board

	Positive feedback		Negative feedback		SUM
	Specific	Non-specific	Specific	Non-specific	
S001	3	3	2	0	**8**
S002	6		4	0	**10**
S003	1		3	0	**4**
S004	3	2	4	0	**9**
S005	8	1	4	0	**13**
S006	8		3	0	**11**
S007	3	1	5	0	**9**
S008	6			0	**6**
S009	10		4	0	**14**
S011	7		17	0	**24**
S012	13	1	2	0	**16**
S013	6		3	0	**9**
S014	7		1	0	**8**
S015	5			0	**5**
SUM	**86**	**8**	**52**	**0**	**146**

The overview of the coded positive and negative feedback sequences elucidates that S011 was the board that showcased most feedback strategies (N=24 instances) and consisted of mostly negative feedback (N=17) at the same time. It was followed by S012 (N=16 instances in total) which, on the contrary, contained the most sequences of specific and non-specific positive feedback (N=14). Interestingly, there were two Padlets (S008 and S015) with specific positive feedback only; however, there was no Padlet with negative feedback only.

Here is an example of an exclusively positive feedback comment: “Hi S008, I think it is very interesting to see how humor affects language teaching and what influence does it have on students learning achievements. S013” (Comment to S008). By contrast, the following was categorized as entirely negative: “Your topics are too broad to be managed. Please go to details about each one in order to make them manageable. S003” (Comment to S006).

Finally, N=2 comments were coded as unclear with respect to the positive or negative tendency of the feedback. Both of them were open questions:

> "Hi S001, did you implement such a research [sic]? If yes, what results did you get from this research so far? Regards, S003" (Padlet Comment by S003 to S001)

> "I was wondering, are the participants your own students and you are incorporating the research […] into your lessons or do they have to make extra time to participate in your project?" (Padlet Comment by S012 to S004)

In both comments, the feedback providers ask questions that are related to the research method and possible findings. Neither hedges nor boosters can be found in both comments. Also, neither praise nor critique were stated explicitly, which makes it hard to classify them as positive or negative feedback. Instead, the questions seem to show a genuine interest in the author's research topic. The use of questions and other linguistic aspects will be examined in the next section.

4.7.10. Linguistic Analysis of the Provided Feedback

As part of the linguistic analysis, pronouns, linguistic hedges, boosters, questions, exclamations, imperatives and abbreviations/shortcuts as well as the use of smileys/ emojis were coded and analyzed (see Figure 23).

With a total of 516 instances, **pronouns** were the most coded linguistic category. In the first step, the pronouns were auto-coded in MAXQDA. Subsequently, every instance was checked manually to delete non-fitting ones (for example "i.e." was automatically coded as the pronoun "I").

Overall, the most used **pronoun** was "you" with 208 instances, followed by "I" with 148 occurrences and "your*" (including "your", "yours", "yourself") with 123 instances. "My" was used 21 times, "we" 10 times, "me" 3 times, "us" 2 times and "our" once. "You"-related pronouns had thus been utilized 331 times in total, and "I"-related pronouns 172 times. With much distance, "we"-related pronouns were used only 13 times in total.

9_Language of the feedback (by providers)	0
9a_Pronouns	0
9a-1_"I"	0
"I"	148
"me"	3
"my"	21
9a-2_"You"	0
"you"	208
"your*"	123
9a-3_"We"	0
"we"	10
"our"	1
"us"	2
9b_Linguistic Hedges	0
9b-1_Modal verbs (may, might, can, could, should)	135
9b-2_Adverbs (maybe, probably)	30
9b-3_Lexical verbs (appear, seem, assume)	29
9b-4_Personal attribution (I think, in my opinion)	61
9b-5_Nouns (idea, assumption, suggestion)	26
9b-6_Adaptors (a bit, a little)	5
9c_Boosters	70
9d_Questions	107
9e_Exclamations	39
9f_Imperatives	12
9g_Abbreviations/shortcuts	9
9h_Use of smileys/emojis	20

Figure 23: Overview of Codings for Feedback Language on Digital Boards

Linguistic hedges occurred in 286 instances and were split into six subcategories: Modal verbs (such as “may”, “might”), adverbs (“maybe”, “probably”), lexical verbs (“appear”, “seem”), personal attribution (“I think”, “in my opinion”), nouns (“idea”, “assumption”), and adaptors (“a bit”, “a little”). With 135 instances, modal verbs were employed most often, followed by personal attribution (61 instances). Adverbs (30), lexical verbs (29) and nouns (26) appeared with a relatively similar frequency. Adaptors were used least (5 instances). Depending on the context of their occurrence, they might express non-prototypicality (Fraser, 2010, p. 19; Gribanova & Gaidukova, 2019, p. 87) or serve as “imprecise quantifiers” (F. Hyland & Hyland, 2001, p. 197).

As the category of personal attribution crisscrosses with the coding of pronouns, additional literature searches were performed to gain greater clarity. In terms of their pragmatic function, a differentiation can be made between hearer- or addressee-oriented, speaker-

oriented and content- or other-oriented hedges and boosters, respectively (Holmes, 1984, pp. 353–354, 359–361).

First, addressee orientation may occur through second-person pronouns (*you*, *your*) (K. Hyland, 2001, p. 549) and the first-person plural pronoun *we* (*us*, *our*). The second-person pronoun *you* and the possessive *your* provide the most explicit acknowledgment of the reader's presence, possibly reinforcing engagement and participation (K. Hyland, 2001, p. 557; 2005, p. 182). Inclusive or collective *we*, in turn, is central to binding writers and readers together in a common endeavor or discoursal practice (K. Hyland, 2001, p. 559) by presupposing shared goals and understandings (K. Hyland, 2001, p. 559; 2005, p. 182). This usage might foster "peer solidarity" (K. Hyland, 2001, p. 559) and invites readers to co-construct meaning while guiding them towards preferred interpretations (K. Hyland, 2005, p. 182). As K. Hyland (2001) explained, it "stresses the involvement of the writer and reader in a shared journey of exploration, although it is always clear who is leading the expedition" (p. 560).

Second, speaker-oriented hedges or self-mentions involve the use of first-person pronouns and possessive adjectives (e.g. *I*, *my*) to convey propositional and affective attitudes by showing clear authorial presence (K. Hyland, 2001, cited in J. Wang & Jiang, 2018, p. 197). Examples include phrases such as *it seems to me, in my opinion, I suppose, I guess*, *if I'm not mistaken* or *unless I heard it incorrectly* (Holmes, 1984, p. 359). In feedback exchanges, personal attribution through self-mentions enables feedback providers to soften criticisms and present assessments as personal opinions rather than authoritative judgments (F. Hyland & Hyland, 2001, p. 198; cf. M.-H. Chang et al., 2012, pp. 295–296). For instance, the statement "I find it hard to know what the main point of each paragraph is" signals an evaluative stance while inviting alternative interpretations or elaborations (F. Hyland & Hyland, 2001, p. 198).

In contrast to speaker- (and hearer-) oriented hedges, content- or other-oriented hedges shift responsibility to a third or depersonalized party. These impersonalization strategies "conceal the source of epistemic judgments" (K. Hyland & Milton, 1997, p. 197) and minimize writer presence through the use of passive voice, nominalization, the selection of objective themes (K. Hyland, 1998, p. 364), depersonalized sentential adverbs (*allegedly, presumably, supposedly*) (Holmes, 1984, p. 360), and (generalized) reference to other sources, e.g. through third-person subjects with reporting verbs (*XY argue, claim, maintain, suggest*) or attribution phrases (*according to X* or *X's view/opinion*) (Holmes, 1984, p. 360). Such referencing can occur through disguised attribution "lacking a specified human agent" (Siewierska 1984, p. 273, cited by Luukka & Markkanen, 1997, p. 168), as in "Many *critics argue* that …" (K. Hyland & Milton, 1997, p. 198), or through attribution to specific external voices (*according to X* or *X's view/ opinion*; *XY claims that*; *XY maintains that*) (Holmes, 1984, p. 360; cf. M.-H. Chang et al., 2012, p. 293). The latter is captured by the "References" category that will be examined below (section 4.7.11).

Analogously, speaker-oriented boosters aim to emphasize the speaker's credibility and include different devices, such as style disjuncts (*frankly, honestly*), reinforcing adjectives (*sure*,

certain) as well as self-mentions in phrases (*in my opinion*) or other personalized forms (Holmes, 1984, p. 353). Hearer-oriented boosters, in turn, appeal to the interlocutor's knowledge and experience as the foundation for the boost (Holmes, 1984, p. 353). Examples include second-person pronouns in phrases like *as you know* and *as you can see*, as well as reader-engagement through expressions such as *of course* and *naturally*. These forms enhance the illocutionary effect by explicitly or implicitly referring to the listener's knowledge or to assumed common background (Holmes, 1984, p. 353). Finally, content-oriented boosters highlight the certainty of a proposition by making an impersonal statement using expressions such as *it is certain (that)*, it goes without saying (that) or intensifying adverbs like *absolutely*, *totally* or *very* (Holmes, 1984, p. 354).

In total, linguistic hedges appeared 286 times, whereas **boosters** were used 70 times, which is 4.1 times less. Furthermore, 107 **questions** were asked, 39 **exclamations** were made and 12 **imperatives** were used. Additionally, there were 9 instances of **abbreviations/shortcuts** and 20 of **smileys/emojis**. Here are some examples for illustration:

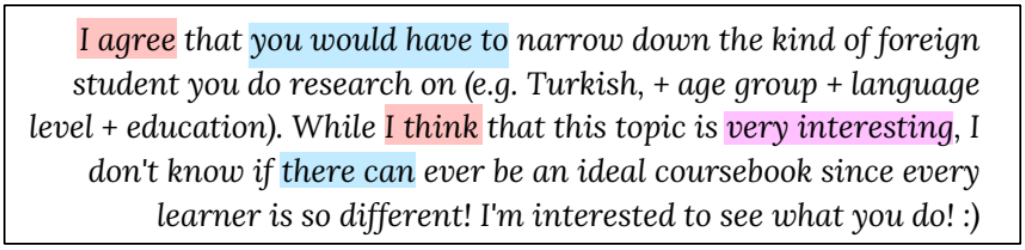


Figure 24: Language Use in Padlet Comment by S014 to S011

In her comment to S011 (see Figure 24), S014 used personal attribution (red), modal verbs (blue), boosters (pink) and a smiley at the end. There were even more linguistic strategies occurring in the following comment (Figure 25).

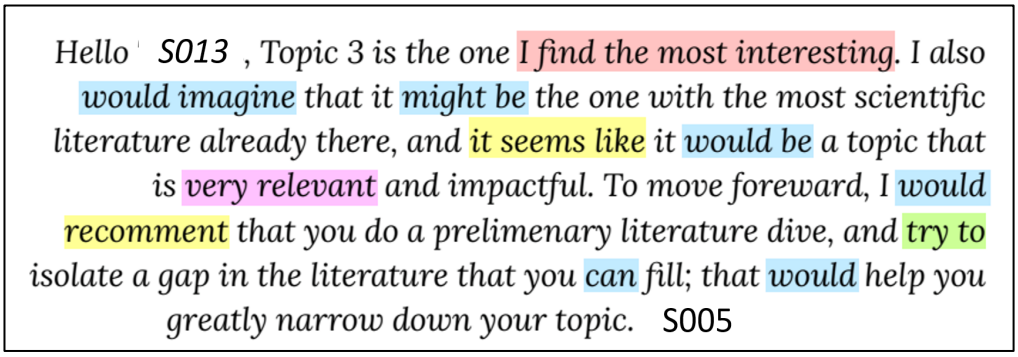


Figure 25: Language Use in Padlet Comment by S005 to S013

S005 employed personal attribution (red), modal verbs (blue), lexical verbs (yellow), boosters (pink) and imperatives (green) in his feedback for S013.

In another comment, there were even four exclamations at once, indicating S005's excitement for the topic S012 is dealing with: "Oh wow! To me this [is] the most interesting topic out of all! […] S014 and I actually talked about this a couple of weeks ago! […] I love this topic!" In-between these exclamations, S005 provided further details and explanations for his positive perception.

Some feedback providers included **abbreviations/shortcuts** in their comments, such as "u" instead of "u": "[…] how do u want to implement it? Through what kinds of tools do u want to make it digitalized?" (Comment by S003 to S006). Moreover, in the comment addressed at S012, S014 shortened "in my opinion" to "IMO", followed by a smiley. These abbreviations and emoticons make the feedback more colloquial, with the feedback providers using linguistic markers to put themselves on the peer level.

4.7.11. References

As mentioned in section 4.7.5 ("Feedback recipients"), there was no direct communication between the feedback providers. However, there were 13 instances of references to communication within (N=10) and outside of Padlet (N=3). Furthermore, in 9 instances, the feedback providers referred to their own experience/knowledge, and in 8 instances they mentioned sources. These references only occurred in comments by the peers and teacher, not in the authors' responses. A general overview of the codes is visualized in Figure 26, while Table 32 provides the distribution of references across the different digital boards.

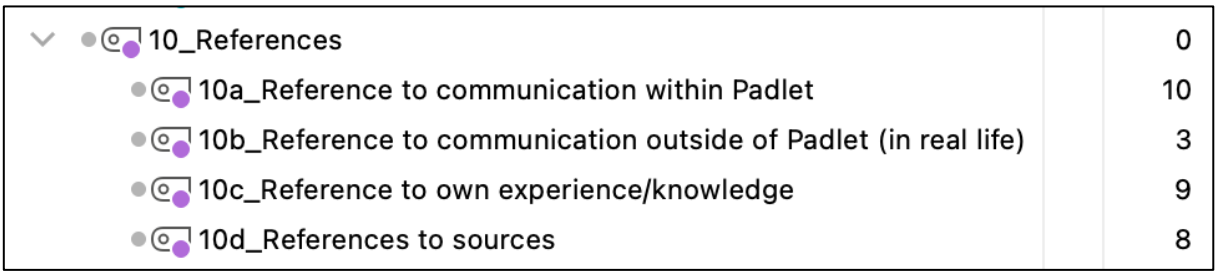


Figure 26: Codings of References on Digital Boards

Table 32: Code Matrix of References on Digital Boards

	Reference to communication within board	Reference to communication outside of board	Reference to own experience/ knowledge	Reference to sources	SUM
S001	1	1			**2**
S002				2	**2**
S003				1	**1**
S004					**0**
S005	2	1	1		**4**
S006	1		2		**3**

	Reference to communication within board	Reference to communication outside of board	Reference to own experience/ knowledge	Reference to sources	SUM
S007				1	**1**
S008	1		2	1	**4**
S009	1				**1**
S011	3		1		**4**
S012		1	2	2	**5**
S013	1				**1**
S014			1	1	**2**
S015					**0**
SUM	**10**	**3**	**9**	**8**	**30**

Table 32 shows that Padlet S012 included the most references (5 instances), followed by S008 and S011 (with 4 instances each). In Padlet S011, most instances of one category occurred, namely reference to communication within Padlet (N=3). In N=7 Padlets (S001, S005, S006, S008, S011, S012, S014), references from more than one category were made, while in 5 Padlets (S002, S003, S007, S009, S013) just one category was mentioned. Finally, in N=2 (S004 and S015) out of the 14 Padlets, no references were established.

To give an example (Figure 27), the doctoral student S001 made reference to her own experience/knowledge (pink) when mentioning that she also worked with textbooks for her Master thesis. Moreover, she provided references to sources (yellow) that S012 (Master student) could consult. Full bibliographical details or hyperlinks to the sources were not included, though, even though this would have been possible on Padlet due to its multimodal affordances.

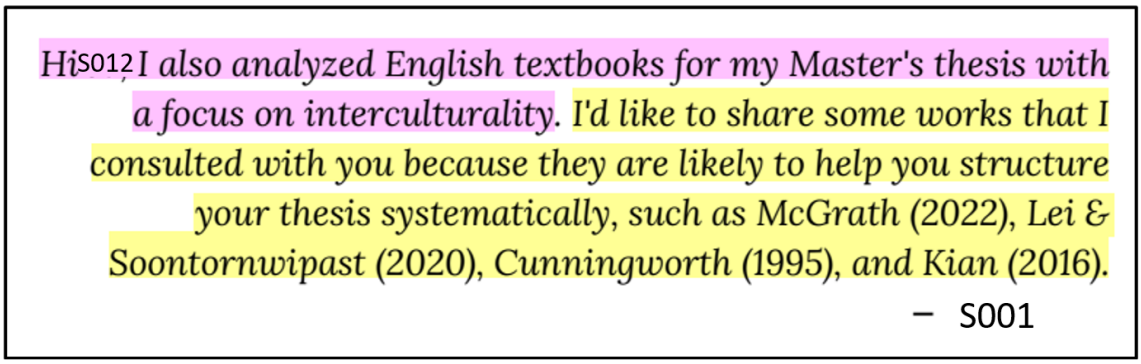


Figure 27: References in the Padlet Comment by S001 to S012

In her comment to S005, S014 even included three types of references: reference to communication outside of the Padlet (green), reference to communication within the Padlet (blue) and reference to own experience/knowledge (pink) (see Figure 28).

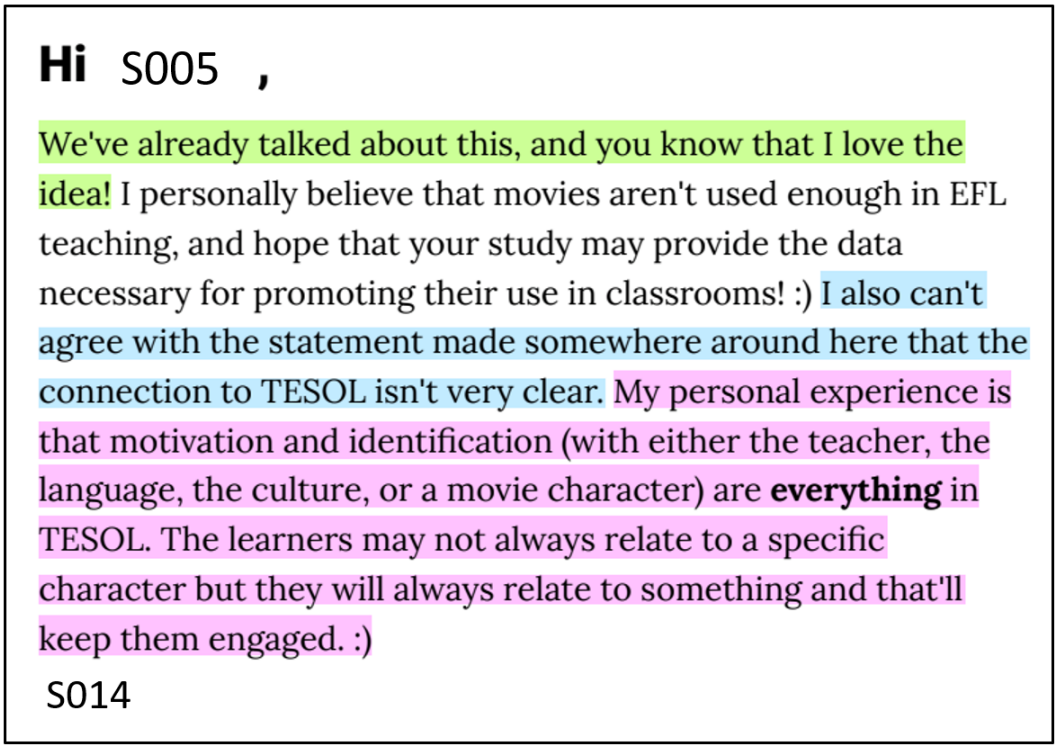


Figure 28: References in Padlet Comment by S014 to S005

In this example (Figure 28), we note another particularity, which is bold print as a possible typographical adjustment used for special emphasis. This aspect will be dealt with next.

4.7.12. Typographical Adjustments

Even though written feedback usually allows for various typographical adjustments, such as italics, bold print, spacing or capitalization, only two instances were detected on all boards. The first one was bold font (for “everything”) shown in Figure 28 above. The second was the capitalization of the word “NOT” in S013’s reply to S003’s remark posted on her Padlet (Figure 29).

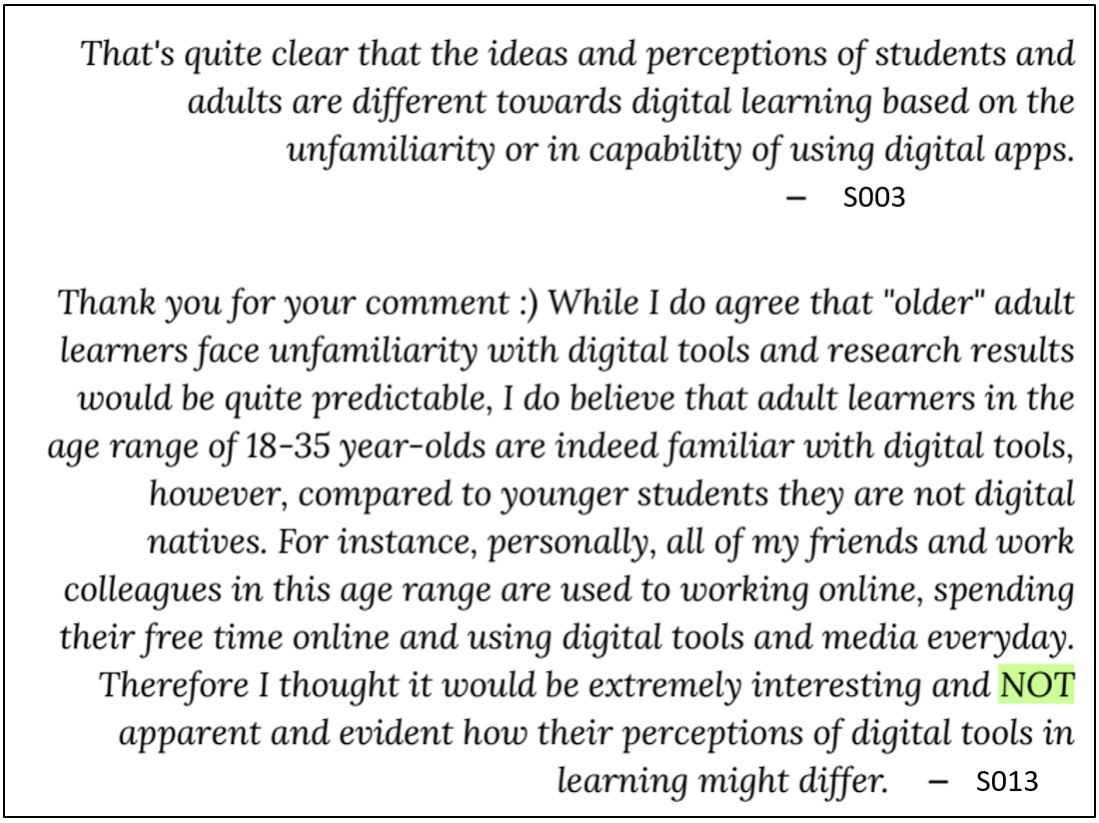


Figure 29: Capitalization in S013's Reply to S003's Comment

This example is evidence of peers reading other students' comments and engaging with them. Here, S013 stresses that she disagrees with the claim made by S003, i.e. that it is "NOT apparent and evident […]". This also leads us to the analysis of the author's responses to the feedback, as will be performed in the next section.

4.7.13. Author's Response to Feedback

The author's responses to the feedback were investigated analogously to the comments that were made by the feedback providers, i.e. their structure and language were coded. Additionally, and similarly to category "6_Feedback object", the contents of the response ("explanation", "thanking", "questions") were analyzed. This resulted to the comprehensive code system shown in Figure 30.

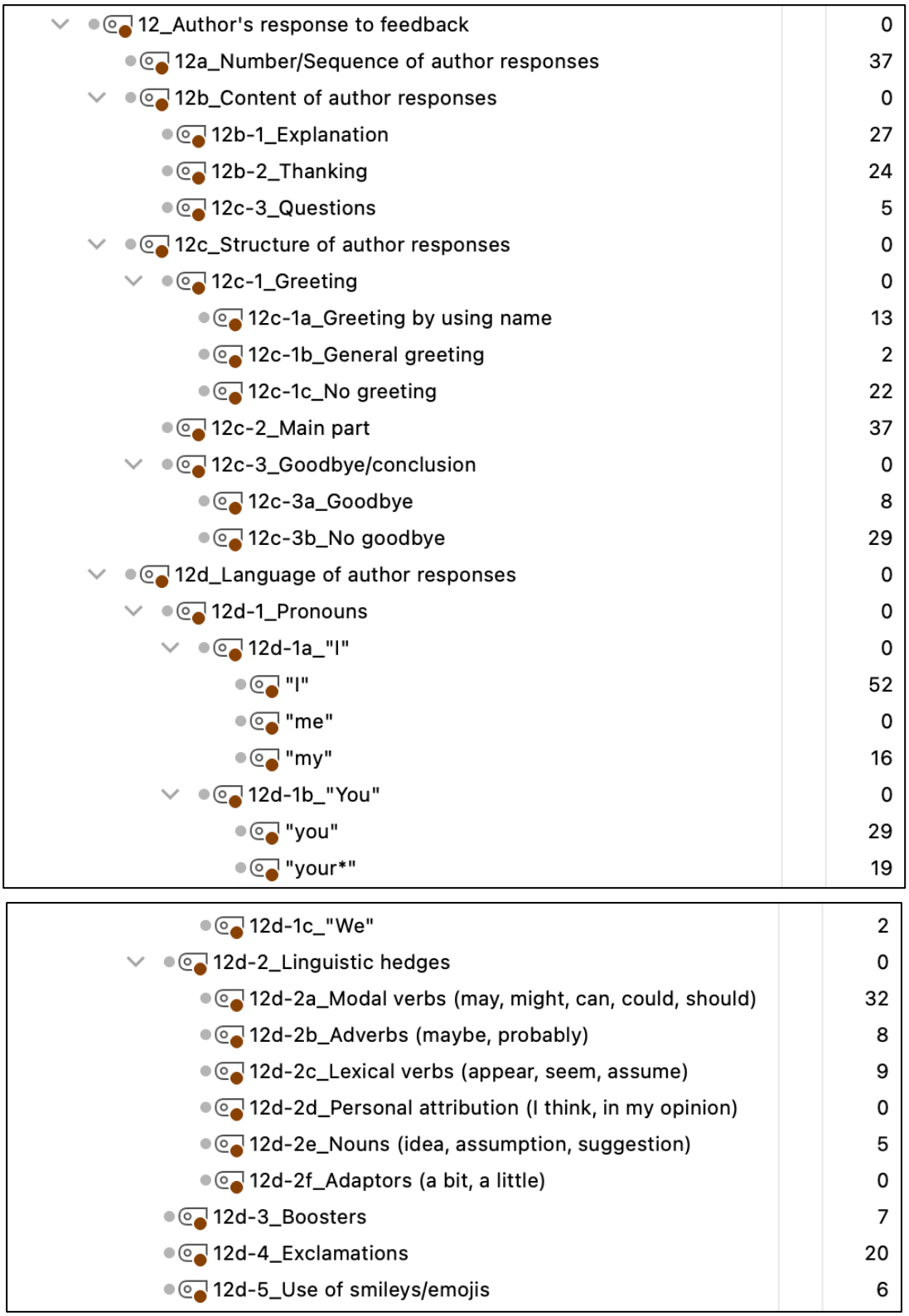


Figure 30: Overview of Codings for Author's Responses on Digital Boards

In total, there were 37 responses to the 134 feedback comments. Most responses included explanations (N=27 instances) and thanking (N=24), supplemented by a few questions (N=5). Furthermore, in N=4 cases, the feedback providers replied to the author's response made to their comment (cf. section 4.7.14 "Reply to author's response").

In the majority of author replies (22 of N=37, i.e. 59.5%), the feedback provider was not **greeted**. In 13 cases, they mentioned their names, whereas N=2 used a general term in their greeting, i.e. “Hi guys” (S002) for peer feedback or “Dear professor” (S003) for teacher feedback. Furthermore, 29 replies ended without a closing or **goodbye**, while N=8 contained one. This typically involved their name; in N=2 cases the name was preceded by the word “Best” (S005, S014) and in N=1 instance by the word “Wishes” (S003).

Regarding **pronoun use**, the author responses mostly included “I” (N=52 instances), followed by “you” (N=29) and “your*” ("your”, “yours”, “yourself”) (N=19). “We” was used twice and there was no instance of “me”. In contrast to the pronoun use in the comments by the feedback providers, the authors (feedback recipients) thus mainly employed “I”-related pronouns in their responses (N=68 times overall), followed by “you”-related pronouns (45 times), and only two “we”-pronouns. The Code Relations Browser shows that “I” occurred 42 times and “my” 11 times in 27 explanations. Furthermore, “you” was deployed 22 times and “your*” 15 times in 24 instances of thanking. The 5 questions included “I” 2 times and “you” 5 times. The distribution of the pronouns in different text segments (i.e. thanks, explanations, and questions) is given in Figure 31.

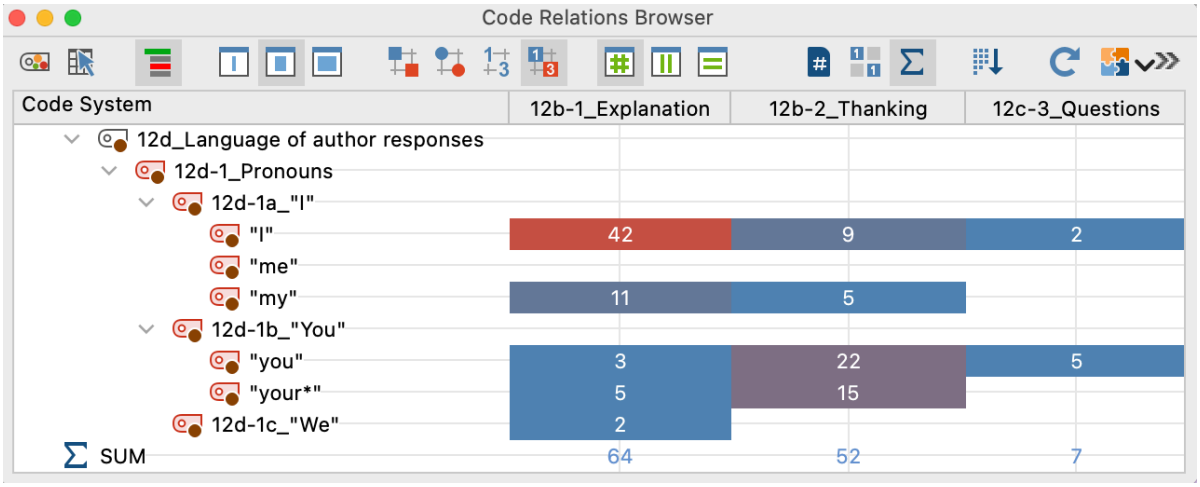


Figure 31: Code Relations Browser of Pronoun Use and Content of Author Responses

It can be seen that “I” mostly occurred in explanations given by the author (N=42), whereas “you” predominated in expressions of thanks (N=22). The pronoun “we” was only used in explanations (N=2). Finally, questions either contained the pronoun “you” (N=5) or “I” (N=2). The two uses of “I” were embedded in a subordinate clause pertaining to a “you” question: “As the task was only to discuss the topic, I am assuming that you are asking this question to understand why I think this topic is significant and what problem it is trying to solve?” (S005’s reply to S003’s comment). While this student asked for clarification, others received requests for clarification but did not explicitly respond to them, as exemplified in S004’s response to S003’s comment:

> "Hi S004, how do you want to make your students homogeneous? On what bases do you divide the students in group [sic] of 4? How do you measure the level of difficulty of presentation? Regards, S003."
>
> - "*Really valuable questions … It is a challenge to team up the students for sure thinking of their levels and other factors.. I will keep these questions in mind. S004*"

In this reply, there is an appreciation of the open questions posed by S003, but not yet a direct response to them. Also, there is no greeting and no closing formula.

By contrast, S001 greeted S002 by her name, thanked for the comment, and then gave an explanation to the question. However, she did not include any form of goodbye or initiation of a follow-up (see Figure 32).

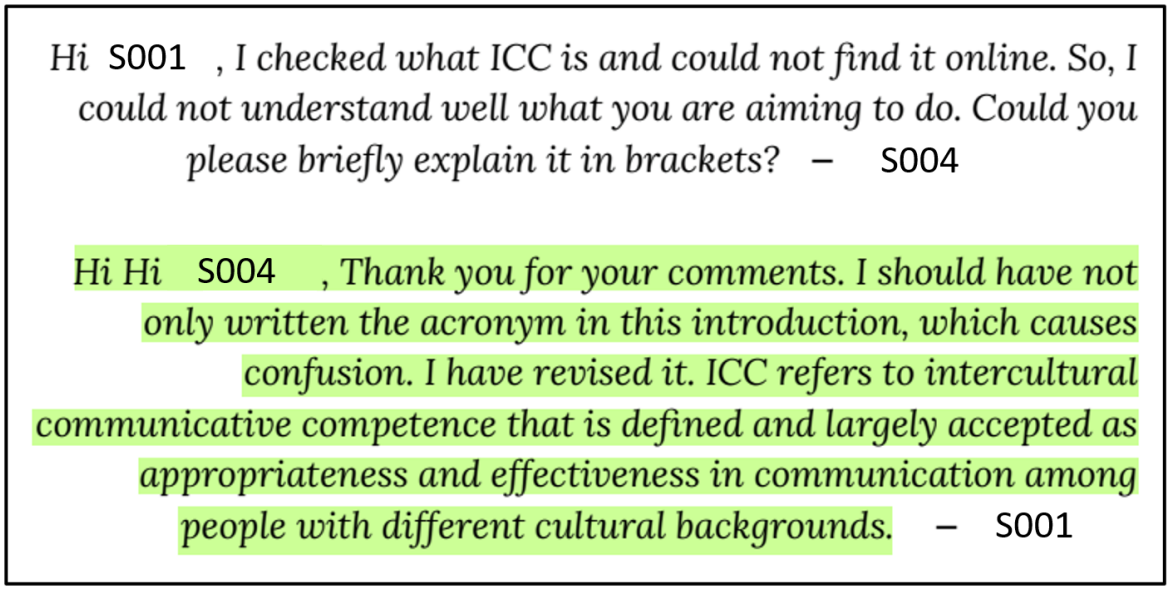


Figure 32: Author Response by S001 to S004's Comment on Padlet

In turn, there was an invitation for a follow-up in S014's reply to S009's comment:

> "Dear S009, thank you so much for your feedback! :) I would focus on the cultural aspects, but linguistic features sound like an interesting factor as well. Do you have any idea what kind of linguistic feature you'd be looking for? Best, S014"

Herein, S014 responded to a comment by greeting S009 with her name, thanking for the feedback, using a smiley, giving an explanation for her question and asking a follow-up question herself as well as saying goodbye. Whether the author responses were replied to again will be examined in the next subsection.

4.7.14. Reply to Author's Response

Usually, the feedback providers did not reply to the author's response (i.e. to the feedback recipient). All in all, follow-up replies only occurred in 4 instances. Sometimes, the response was

very short, as in “Thank you very much S005 and the best for you. S003”. By contrast, communication evolved further on S011’s Padlet (Figure 33).

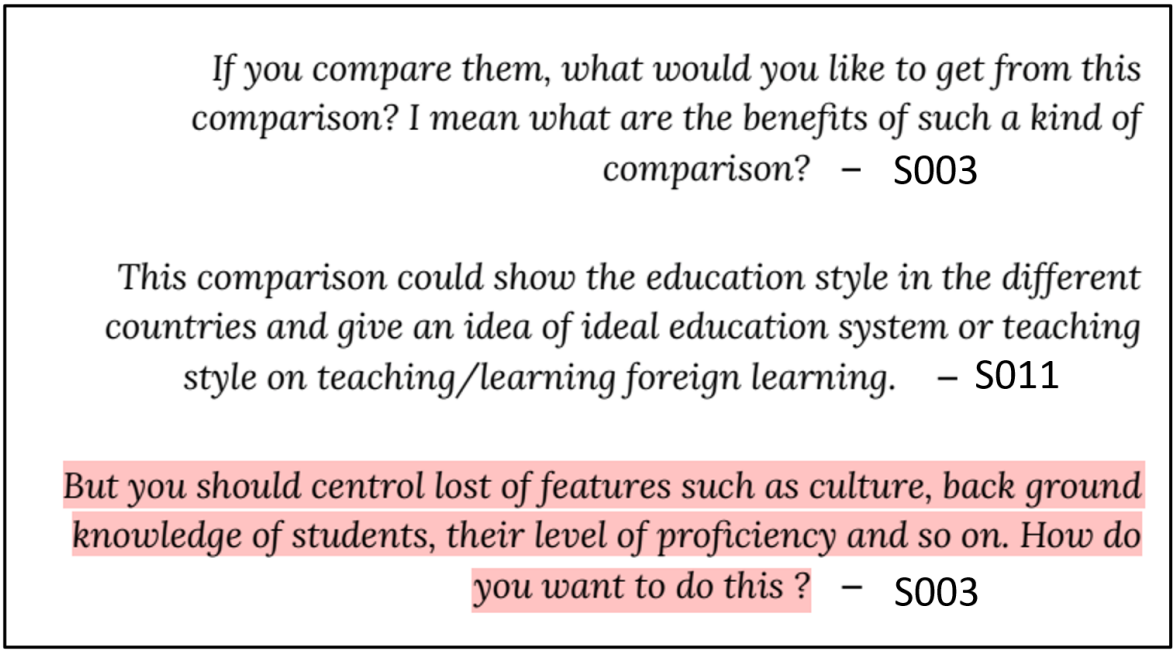


Figure 33: Reply by S003 to S011’s Author Response

In Figure 33, S003 gave another recommendation to the author S011 after she had answered S003’s initial questions. The conversation could go even further because S003 is asking another question to the author.

The other peer replies to author responses, however, did not contain any follow-up questions. More precisely, S014 replied to the author’s (S012’s) thanks by elaborating that she had been working on this specific topic in her Bachelor thesis. Additionally, she expressed interest in reading the author’s thesis.

Finally, on S014’s digital board, S001 replied to a question that was directed at her in the author’s response. S001 had asked what research method would be used, S014 gave an explanation and then inquired whether this would be problematic in S001’s view. Accordingly, S001 replied again, as depicted in Figure 34.

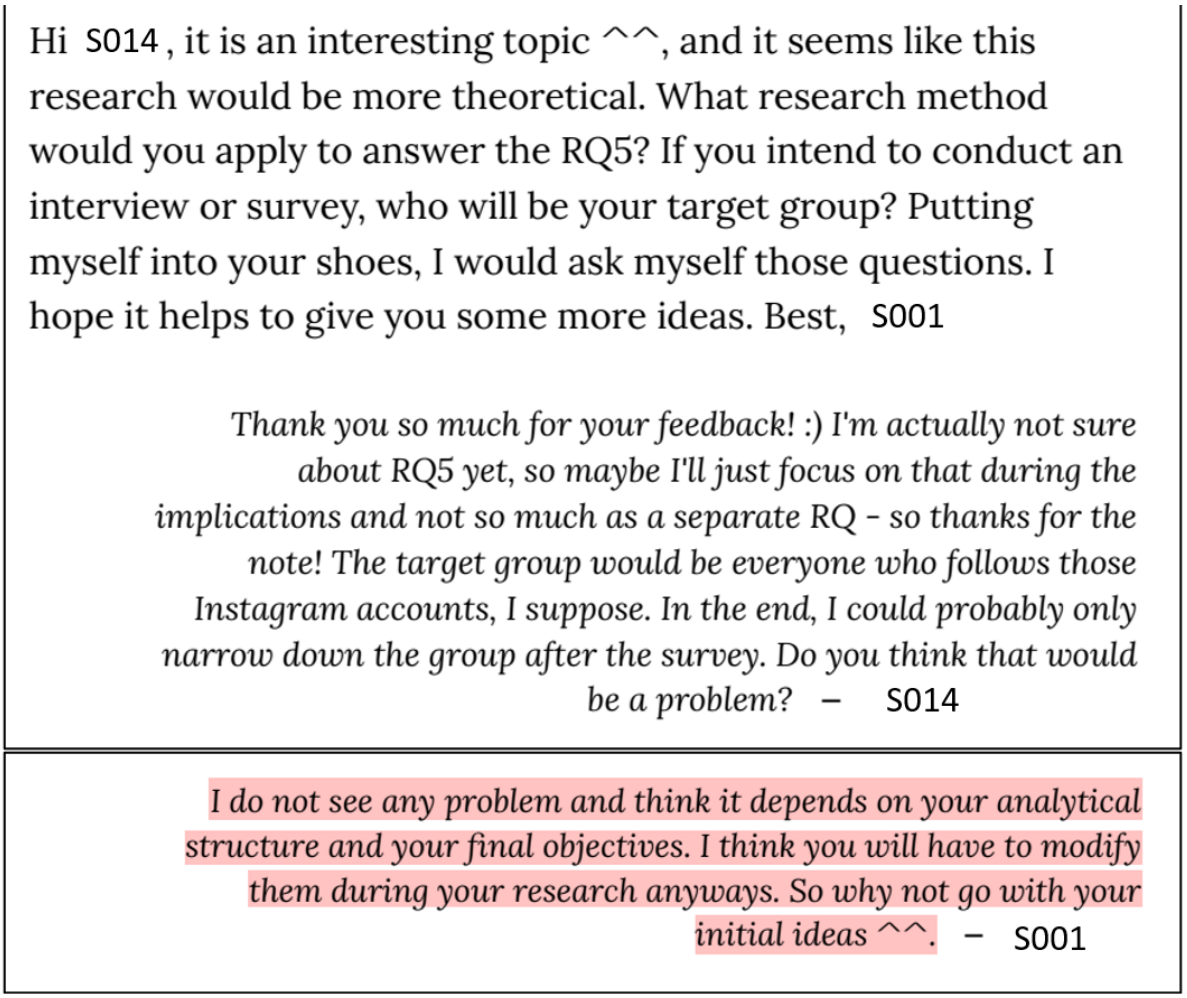


Figure 34: Reply by S001 to S014's Author Response

It is highly likely that the limited number of conversational threads on the digital boards resulted from students' knowing about the possibilities for further communication and clarification in the subsequent session and in follow-up tasks. While the variation of pedagogical designs will be addressed in the discussion chapter, the following sections will attempt to discover interrelations between the aforementioned categories and inquire into possible reasons.

4.7.15. Examining Relations between the Categories

This section is devoted to exploring relations between several of the previous categories, notably in terms of positive and negative feedback sequences.

4.7.15.1. Code Relations of Positive/ Negative Feedback Strategies and Feedback Objects

To investigate the relations between specific positive and negative feedback with the **feedback object** (see section 4.7.7), a code relations browser was run (Table 33).

Table 33: Code Relations of Positive and Negative Feedback Strategies and Feedback Objects

Category	Topic-related feedback	Research Method	Purpose/ Signif-icance	Research ques-tions	Literature/ Sources	Findings	Participation	Language	Originality
Sequence of positive fb.	62	26	5	4	7	2	0	0	0
Explanation to positive fb.	25	2	3	0	2	0	0	0	0
Recommendation to positive fb.	27	23	0	4	6	1	0	0	0
Non-specific positive fb.	3	2	0	0	0	1	1	0	0
Sequence of negative fb.	32	16	4	5	1	0	0	2	1
Explanation to negative fb.	3	1	0	0	0	0	0	0	0
Recommendation to negative fb.	29	10	1	5	1	0	0	2	1
SUM	188	81	16	20	20	4	1	4	2

Table 33 demonstrates that sequences of specific positive (62 instances) and negative (32) feedback as well as recommendations to both positive (27) and negative (29) feedback mostly referred to the author's research topic (topic-related feedback). Moreover, N=5 (topic-related, research method, purpose/significance of study, research questions, literature/sources) out of N=9 feedback objects were utilized in both positive and negative feedback. However, feedback on findings and participation were only positive in nature, whereas language and originality exclusively appeared in negative feedback.

4.7.15.2. Code Relations of Positive/ Negative Feedback Strategies and Feedback Purposes

The Code Relations Browser shown in Figure 35 reveals relations with the **feedback purposes**.

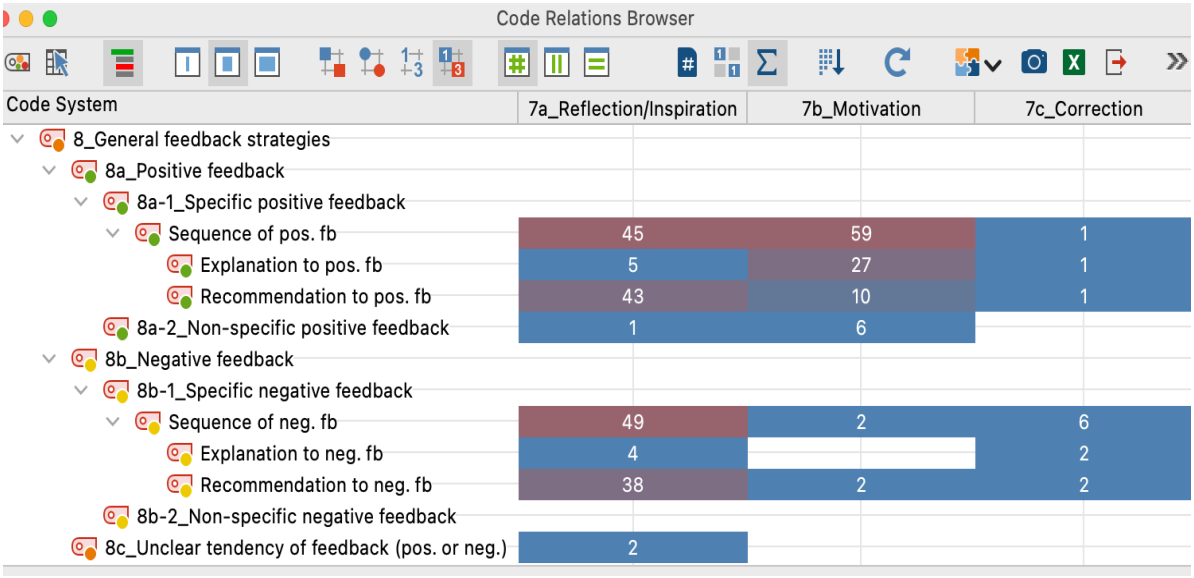


Figure 35: Code Relations Browser of Positive and Negative Feedback Strategies and Feedback Purpose

As can be seen, most **specific positive feedback** had the purpose of motivating the authors (N=59 instances). This was closely followed by feedback for reflection or inspiration (N=45). In 27 instances, an explanation was provided to specific positive feedback that had a motivational purpose, but only N=10 recommendations were offered. Conversely, specific positive feedback with the purpose of reflection/inspiration (N=45) rather contained recommendations (43 times) than explanations (N=5).

Turning to **specific negative feedback**, we see that almost all sequences (N=49 out of 57, i.e. 86.0%) were given with the purpose of reflection or inspiration. The wide majority (N=38 out of 49 segments, i.e. 77.6%) offered recommendations for improvement. An example of negative feedback with a recommendation that was given with the purpose of encouraging reflection in the form of questions is the following anonymous comment to S004: “Do you think that YouTube is […] suitable for such a research [sic]? Why not […] consider another tool?”

Non-specific positive feedback was mostly offered with the purpose of motivation (6 instances). Finally, the two unclear feedback passages seemed to have a reflectional or inspirational intent (see section 4.7.9).

4.7.15.3. Code Relations of Positive/ Negative Feedback Strategies and Language of the Feedback

Next, the **language of the feedback** was investigated in relation to positive and negative feedback strategies. For this, Code Relations Browsers were enacted in MAXQDA (see Figure 36 and Figure 37) and the following major findings were obtained.

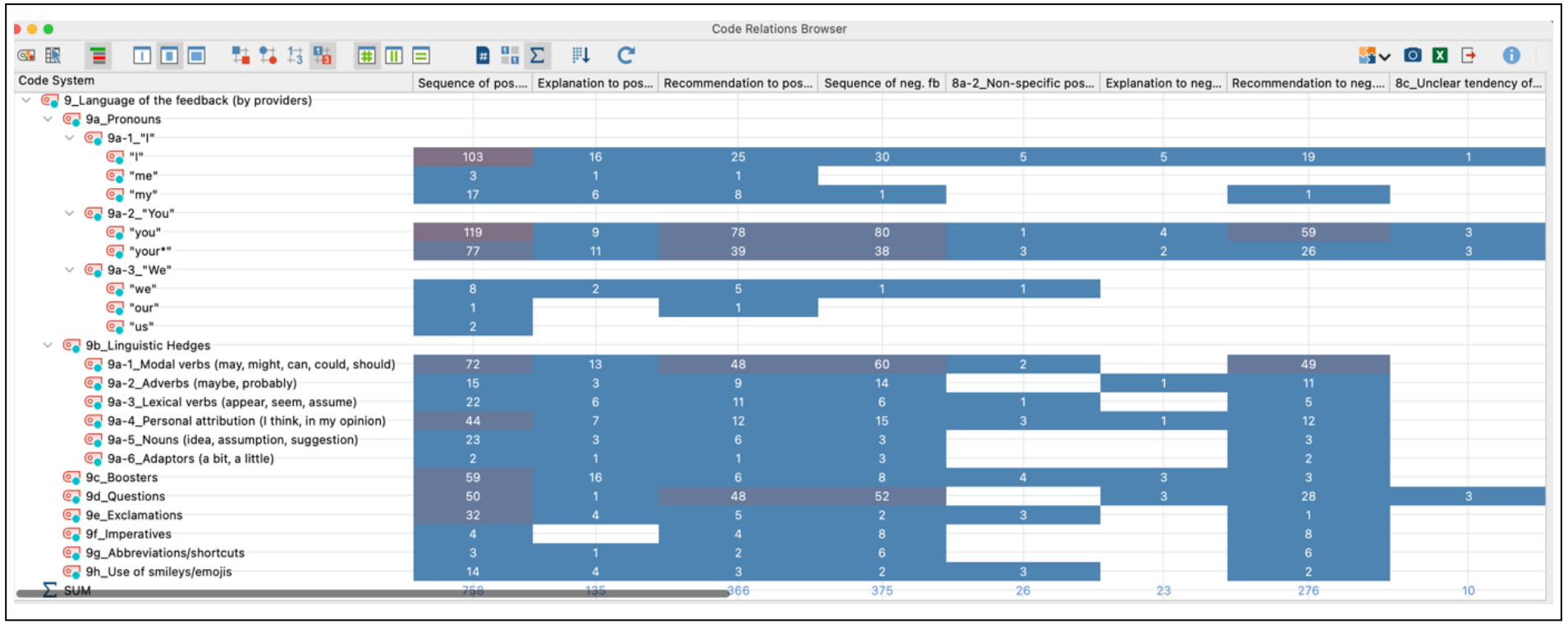


Figure 36: Code Relations Browser of Positive and Negative Feedback Strategies with Linguistic Categories

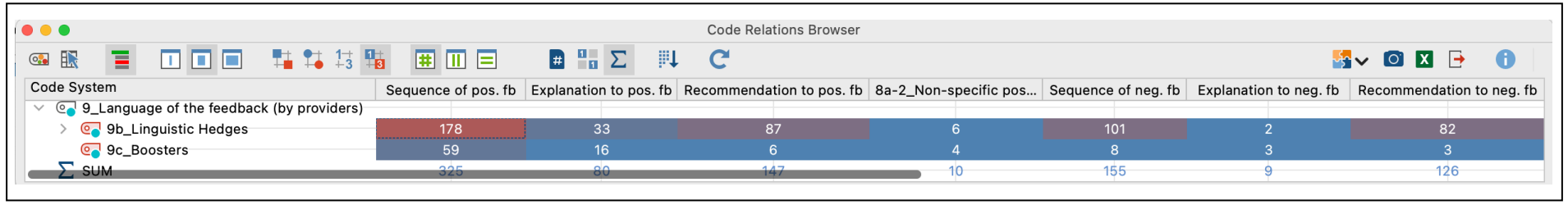


Figure 37: Code Relations Browser of Positive and Negative Feedback Strategies with Hedges and Boosters

In the sequences of **specific positive feedback** (N=86 in total), the pronouns "you" (N=119 instances) and "I" (N=103) had been utilized most often. Furthermore, linguistic hedges (N=178) were used more often than boosters (N=59). 50 questions were asked, 32 exclamations were made, and 4 imperatives were used. Smileys/emojis were employed in 14 instances.

In the sequences of **specific negative feedback** (52 in total), the pronoun "you" was used 80 times and "I" 30 times. "Your*" appeared 8 times more often than "I". Here, linguistic boosters were deployed in 101 instances and boosters in N=8 cases. 52 questions were asked, 2 exclamations were made, and 8 imperatives were written on the digital boards. Smileys/emojis appeared 2 times. The averages per feedback type are calculated in Table 34.

Table 34: Language of the Feedback in Specific Positive and Negative Feedback in Total and on Average

Language category	Specific positive fb. (N=86)		Specific negative fb. (N=52)	
	Total	Average	Total	Average
Pronouns	330	3.84	150	2.88
"I" words total	***123***	***1.43***	***31***	***0.60***
"I"	103	1.2	30	0.58
"me"	3	0.03	0	-
"my"	17	0.2	1	0.02
"You" words total	***196***	***2.28***	***118***	***2.27***
"you"	119	1.38	80	1.54
"your*"	77	0.9	38	0.73
"We" words total	***11***	***0.13***	***1***	***0.02***
"we"	8	0.09	1	0.02
"our"	1	0.01	0	-
"us"	2	0.02	0	-
Linguistic hedges	178	2.07	101	1.94
Modal verbs	72	0.84	60	1.15
Adverbs	15	0.17	14	0.27
Lexical verbs	22	0.26	6	0.12
Personal attribution	44	0.51	15	0.29
Nouns	23	0.27	3	0.06
Adaptors	2	0.02	3	0.06
Boosters	59	0.69	8	0.15
Questions	50	0.58	52	1
Exclamations	32	0.37	2	0.04
Imperatives	4	0.05	8	0.15
Abbreviations	3	0.03	6	0.12
Smileys/emojis	14	0.16	2	0.04

On average, M=3.84 **pronouns** occurred in N=86 sequences of positive feedback, and M=2.88 pronouns in N=52 sequences of negative feedback. Interestingly, "I" words (I, me, my) were used about 2.5 times more often in specific positive feedback (M=1.43 occurrences per feedback sequence) than in specific negative feedback (M=0.60). By contrast, the "you" words (you, your*) were almost balanced between stretches of specific positive (M=2.28) and specific negative feedback (M=2.27). Due to the very rare occurrence of "we" words (we, our, us), inferences are difficult to draw. If they occurred, they were usually part of specific positive feedback.

Furthermore, M=2.07 linguistic **hedges** surfaced in passages of positive feedback, and M=1.94 in sequences of negative feedback. They thus appeared to be almost equally distributed between the two categories. By contrast, **boosters** were employed more often in sequences of positive feedback (M=0.69) than in sequences of negative feedback (M=0.15 times).

Questions were asked M=0.58 times in sequences of positive feedback and M=1 in sequences of negative feedback. They thus seemed to be a more typical component of negative feedback, but due to the overall low count, definite conclusions are hard to draw.

4.7.15.4. Code Relations of Feedback Purpose and Language of the Feedback

Through another Code Relations Browser, the code co-occurrences of feedback purposes and linguistic aspects were retrieved and depicted in Figure 38.

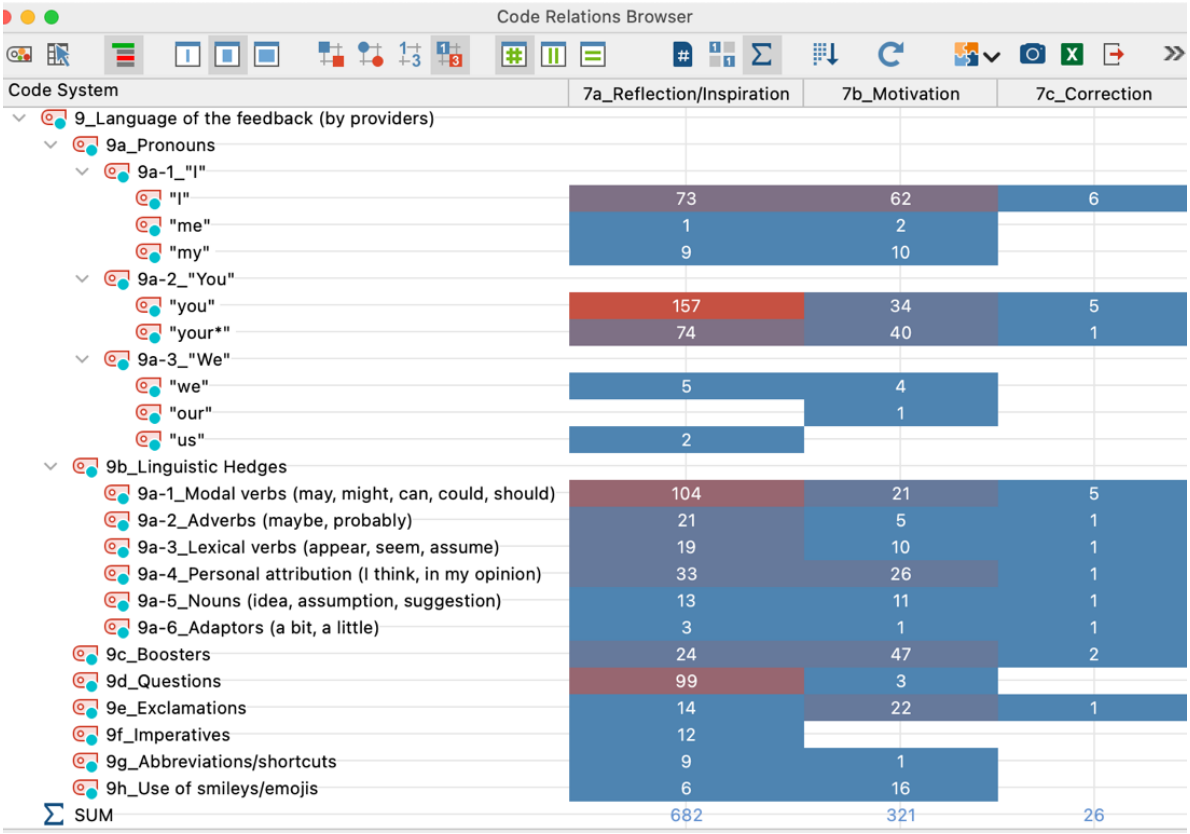


Figure 38: Code Relations Browser of Feedback Purpose and Language of the Feedback (by Providers)

Moreover, averages were calculated in Table 35.

Table 35: Codings of Pronouns and Feedback Purpose in Total and on Average

Pronouns	Reflection/Inspiration		Motivation		Correction	
	Total	Average	Total	Average	Total	Average
I (incl. "I", "me", "my")	83	0.91	74	1.10	6	0.86
You (incl. "you", "your*")	231	2.54	74	1.10	6	0.86
We (incl. "we", "our", "us")	7	0.08	5	0.07	-	-

It can be observed that feedback with the purpose of reflection/inspiration mainly contained the pronoun "you" (N=157 instances), modal verbs (N=104), questions (N=99), the pronoun variants of "your*" (N=74) and the pronoun "I" (N=73). Noticeably, imperatives were provided with the purpose of reflection/inspiration (N=12). Furthermore, boosters (N=47) and exclamations (N=22) appeared more often in motivational feedback (total of 67 instances) than in feedback serving reflection/inspiration (total of 91 instances). In contrast to feedback with the purpose of reflection/inspiration, feedback for motivation included more instances of the pronoun "I" (N=62) than "you" (N=34 instances).

On average, "you" (incl. "you", "your*") was utilized M=2.54 times and "I" (incl. "I", "me", "my") M=0.91 times in feedback serving the purpose of reflection/inspiration. In motivational feedback, both pronouns "I" and "you" appeared equally often (M=1.10). Furthermore, in corrective feedback, "I" and "you" occurred with the same mean frequency (M=0.86).

Some examples serve to illustrate the most frequent interrelations. As part of her longer comment, S014 stated, "I […] hope that your study may provide the data necessary for promoting their use in classrooms :)". Thus, S014 tried to motivate S005 by using an exclamation (introduced by the pronoun "I"), the pronoun "your", the modal verb "may" and a smiley at the end. Moreover, in her comment to S002, S014 posed questions for reflection by utilizing the modal verb "would": "What exactly would such an e-portfolio look like? What kind of assignments would it include?". Similarly, S005 asked, "Hello S003, What would you say is the purpose of your study? […]". Here, a question for reflection was posed with the help of modal verb "would" and the pronouns "you" and "your".

4.7.15.5. Code Relations of Feedback Object and Feedback Purpose

To discover code co-occurrences of feedback objects and feedback purposes, a Code Relations Browser was executed that is displayed in Figure 39.

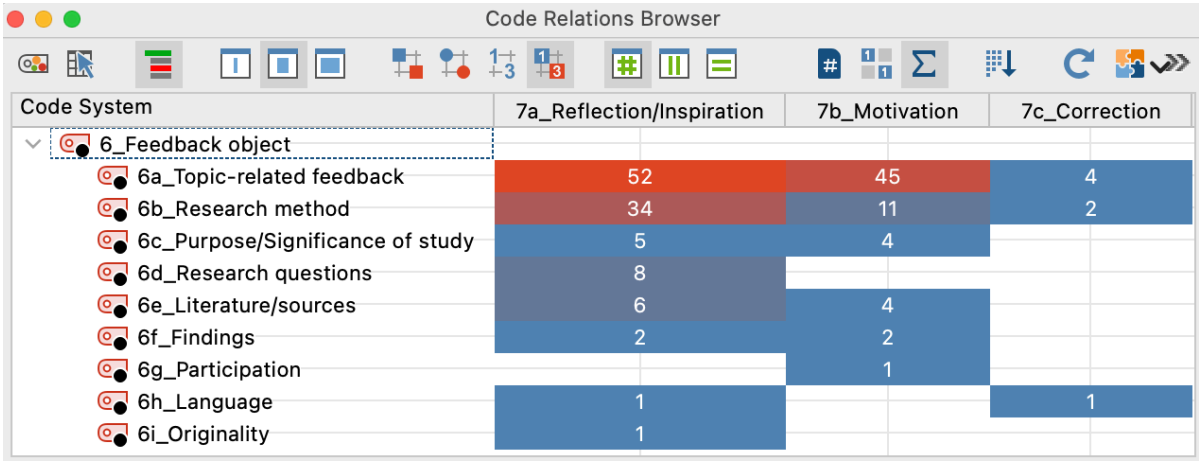


Figure 39: Code Relations Browser of Feedback Object and Feedback Purpose

Furthermore, the averages per comment were calculated, as shown in Table 36.

Table 36: Co-occurrences of Feedback Object and Feedback Purpose in Total and on Average

Feedback object	Reflection/Inspiration		Motivation		Correction	
	Total	Average	Total	Average	Total	Average
Topic-related	52	0.57	45	0.67	4	0.60
Research method	34	0.37	11	0.16	2	0.29
Purpose/Significance	5	0.05	4	0.06	-	-
Research questions	8	0.09	-	-	-	-
Literature/sources	6	0.07	4	0.06	-	-
Findings	2	0.02	2	0.03	-	-
Participation	-	-	1	0.01	-	-
Language	1	0.01	-	-	1	0.14
Originality	1	0.01	-	-	-	-

The Code Relations Browser (Figure 39) reveals that most feedback was **topic-related** with the purpose of reflection/inspiration (N=52 instances) and motivation (N=45). However, the averages per feedback passage were highest for motivation, but still relatively similar across all three categories, with M=0.67 for topic-related motivation, M=0.57 for topic-related reflection/inspiration, and M=0.60 for topic-related correction (Table 36).

Even more so, feedback on the **research method** was mainly given for reflective/inspirational purposes (N=34). Here are some examples for illustration:

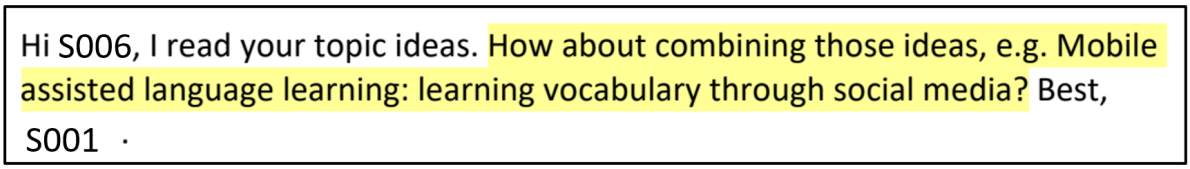

Hi S006, I read your topic ideas. How about combining those ideas, e.g. Mobile assisted language learning: learning vocabulary through social media? Best,
S001 .

Figure 40: Padlet Comment by S001 to S006

In her comment to S006, S001 gave topic-related feedback for reflection (Figure 40). Similarly, she offered S009 feedback on the research method for reflection (Figure 41).

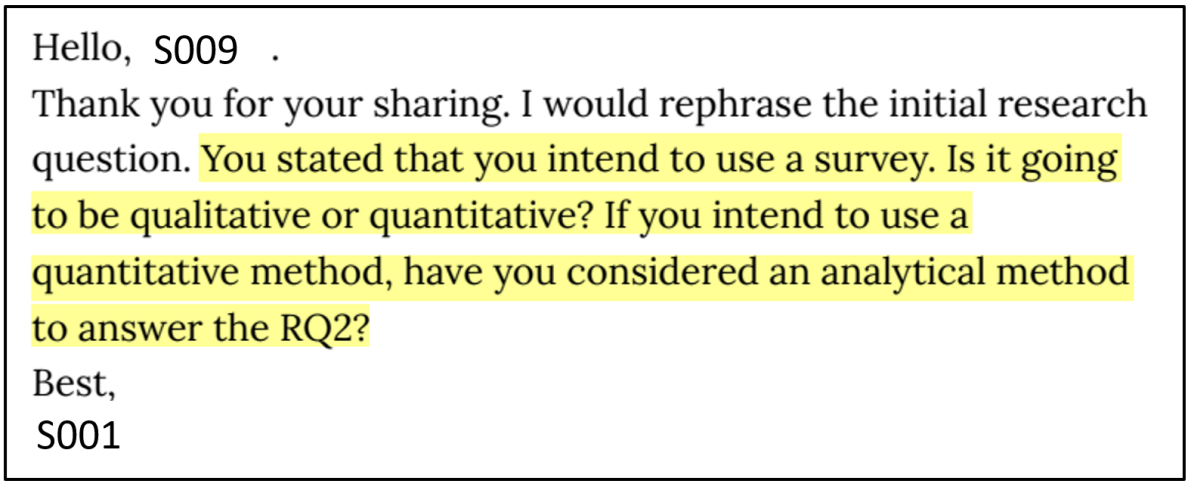

Hello, S009 .
Thank you for your sharing. I would rephrase the initial research question. You stated that you intend to use a survey. Is it going to be qualitative or quantitative? If you intend to use a quantitative method, have you considered an analytical method to answer the RQ2?
Best,
S001

Figure 41: Padlet Comment by S001 to S009

Finally, feedback with the purpose of correction was provided N=7 times in total, of which N=4 referred to a topic-related aspect, N=2 to the research method and N=1 to language. On the one hand, it is striking to see that corrections occurred very rarely in the data corpus. On the other hand, this is reasonable in view of the assignment type: It was a presentation of ideas, mostly at a very early stage of the research process, so that motivation and inspiration were deemed more important or more relevant than correction. In contrast, an assignment such as a written research essay might have encouraged a higher proportion of corrections.

4.7.16. Exploring Reasons for Authors' Usefulness Evaluation

As mentioned at the beginning of this analysis (section 4.7.1), the authors rated the usefulness of the feedback received via digital boards as "highly useful", "mostly useful", "slightly useful", or "not at all useful" in Survey 1 (see section 4.3.3). Possible reasons for their evaluations might be found by comparing the categories "text comments", "general feedback strategies", and "feedback purpose" (see Table 37).

Table 37: Overview of Digital Boards and the Perceived Usefulness, Number of Comments, Feedback Strategies and Purpose of Feedback

Board	Academic status	Usefulness evaluation	Number of comments	Feedback strategies		Feedback purpose		
				Sequences of pos. fb.	Sequences of neg. fb.	Reflection	Motivation	Correction
S001	PhD student	1 "not at all"	9	7	3	4	5	0
S002	(prosp.) PhD	5 "highly"	9	10	7	5	6	0
S003	(prosp.) PhD	5 "highly"	4	2	4	4	1	0
S004	PhD student	5 "highly"	7	9	6	6	5	0
S005	MA student	2 "slightly"	12	17	8	7	9	1
S006	MA student	5 "highly"	10	17	7	6	4	0
S007	MA student	4 "mostly"	8	7	10	7	4	0
S008	MA student	5 "highly"	6	13	0	2	7	1
S009	MA student	4 "mostly"	12	19	7	9	4	1
S011	MA student	5 "highly"	19	10	35	18	3	3
S012	MA student	5 "highly"	16	28	3	8	7	1
S013	MA student	4 "mostly"	9	12	6	6	3	0
S014	(prosp.) PhD	4 "mostly"	8	15	1	6	5	0

Interestingly, the students whose boards contained the most (S011) and the least (S003) comments both rated the usefulness as high. Also, the Padlet receiving the most negative feedback (S011) and the one with the most positive feedback (S012) gave the same rating: highly useful.

Furthermore, the one author who assessed the usefulness as “slightly useful” (S005) received more than twice as much positive (N=17 instances) than negative feedback (N=8 instances) and more feedback for motivation (N=9) than for reflection (N=7). Also, it is noticeable that the N=4 authors who rated the usefulness as “mostly useful” (S007, S009, S013, S014) received feedback mainly for the purpose of reflection.

As there does not appear to be a clear correlation between the categories, another code relations overview was created that focused on the feedback object/content (Table 38).

Table 38: Overview of Digital Boards with Usefulness Evaluation and Codings of Feedback Object

Padlet	Academic Status	Usefulness	Topic-related	Research method	Purpose/ significance	Research questions	Literature/ sources	Findings	Participation	Language	Originality
S001	PhD student	1	3	3	-	-	-	2	1	-	-
S002	(prosp.) PhD	5	5	4	-	1	-	-	-	-	-
S003	(prosp.) PhD	5	1	3	2	-	-	-	-	1	1
S004	PhD student	5	2	5	-	-	1	-	-	-	-
S005	MA student	2	5	5	2	-	-	-	-	-	-
S006	MA student	5	7	3	-	-	1	-	-	-	-
S007	MA student	4	7	-	-	1	1	-	-	-	-
S008	MA student	5	4	2	1	-	1	-	-	-	-
S009	MA student	4	8	4	2	3	-	1	1	-	-
S011	MA student	5	7	3	1	-	-	-	-	1	-
S012	MA student	5	3	2	-	1	-	-	-	-	-
S013	MA student	4	9	-	1	1	3	-	-	-	-
S014	(prosp.) PhD	4	6	5	-	1	-	-	-	-	-

The highest amount of topic-related feedback was given to S011 and S012, and both of them evaluated the overall usefulness of all comments as "highly useful". However, others, who obtained hardly any feedback on the topic (e.g. S003, S004), likewise rated the feedback as "highly useful". Instead, they obtained feedback on the research method and the significance of the project. The overall counts were pretty low, though. Moreover, students who received almost the same number of comments on similar aspects (e.g. S002 and S005) evaluated the feedback as either "highly useful" or "slightly useful".

Therefore, a **correlation** between the author's ratings on the one hand and the number of comments, the sequences of positive and negative feedback, the feedback purposes and the feedback objects on the other hand **cannot be found**. Rather, the explanations given by the feedback receivers themselves promised to be more revealing (see survey 1 analysis in section 4.3.3 for more details). For instance, in survey 1, S012 considered the feedback "highly useful", as it included "constructive criticism on what might not work out (e.g. topic is not narrowed down yet, outcome of research might be obvious)". An example is provided in Figure 42.

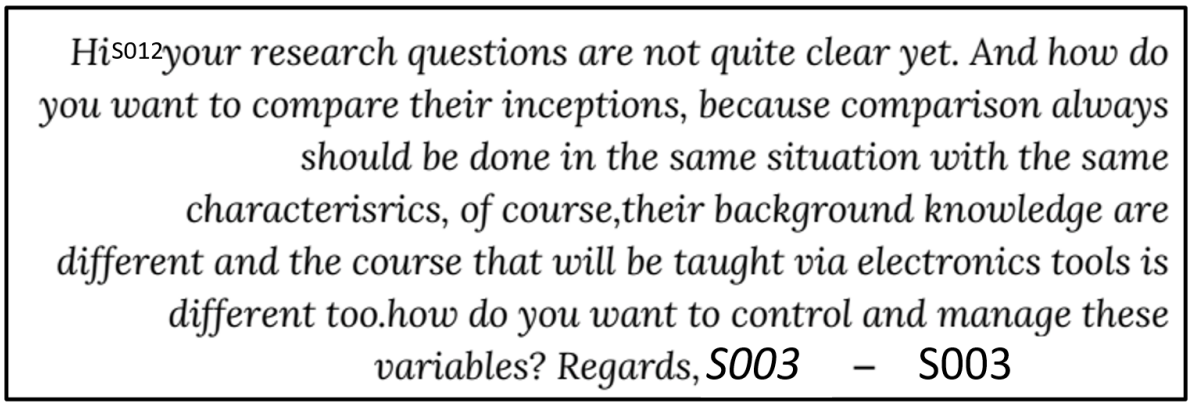


Figure 42: Padlet Comment by S003 to S012

While this example instantiates the use of a (critical) question, another comment even included several reflective questions in a row:

> "That is a very interesting topic, but the only thing that came to my mind was which schools in Germany? Do they all use the same textbooks? What provisional outcome do you think will it lead you to? Can it end up with something related to politics? Is it something you want to dive into?" (Padlet Comment by S004 to S012)

Indeed, in the follow-up survey 1, S012 explained that she "liked that some peers asked (critical) questions to make sure I understand on what aspects I still need to work on".

Similarly, S012 received positive feedback along with suggestions for reflecting on the wider implications of her study, together with a concrete reference to a literature source (see Figure 43).

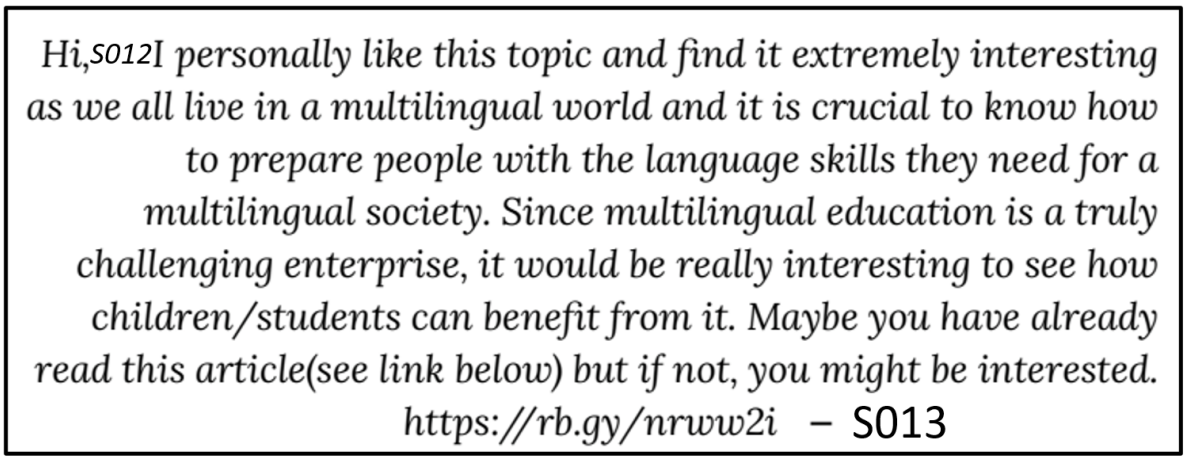


Figure 43: Padlet Comment by S013 to S012

Contrasting with the previous view that peer feedback on the digital boards was specific and helpful, a few others (notably S001 and S005, but to some extent also S007 and S009) found it too broad and unhelpful. The following two examples illustrate this unspecific nature of some comments:

> "Hi, I am very interested in this topic as intercultural communicative competence is an essential set of skills needed in a modern globalised world. S013" (Comment by S013 to S001)

> "Hi S009, Integration of Games in the EFL Classroom sounds really interesting to find out if games motivate children to speak English and use new vocabulary. S013" (Comment by S013 to S009)

Since the three preceding examples of specific and unspecific feedback came from the same person (S013), this possibly points to individual and/ or situational (maybe thematically motivated) variation in the way comments were provided.

S001, who assigned the lowest score 1 for the usefulness evaluation, indeed received many general comments. The screenshot in Figure 44 instantiates this mostly unspecific nature of the comments S001 obtained that did not relate to the specific feedback requests she had posed.

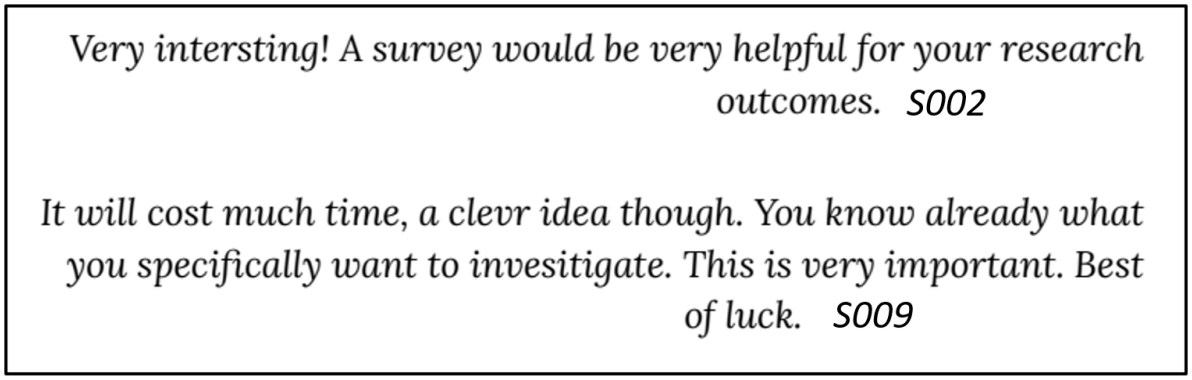


Figure 44: Padlet Comments by S002 and S009 to S001

Likewise, in S009's view, her peers did not understand the area of her research and only provided brief and unhelpful comments, such as the following ones:

> "Hi S009, You have chosen a really interesting topic. Games and other digital tools are highly popular these days, especially among the young generation. Many teachers use such interesting tools in classrooms to draw attention, so research on this area is really beneficial. Best, S007" (Padlet Comment by S007 to S009)

> "Of course games could be effective for learning but for the initial ages of learning not for adults." (Anonymous Padlet Comment to S009)

Additionally, S005 had some negative perception of the feedback he received, which will be further dealt with later on.

4.7.17. Summary of Findings from the Digital Board Analysis

After the detailed presentation of results for digital boards, some key findings will be recapitulated here before we move on to the next feedback analysis.

In the current study, most students decided to create a digital board with a fixed structure (e.g. in table format) over one with a flexible structure (where the posts could be moved around). The majority of Padlets offered the option to like or rate a comment/post. On most boards, the students as well as their peers decided to keep the default color of their posts/comments (usually, it was yellow).

Virtually all comments were text-based, with hyperlinks being added rarely. Interestingly, most hyperlinks to websites were given by doctoral students. Higher-level peers (doctoral to Master) provided feedback the most, followed by comments by same-level peers (Master), comments by the teacher and comments by same-level peers (doctoral) and lower-level peers (Master to doctoral or postdoctoral). Additionally, some feedback comments were anonymous (which was partly caused by the board settings).

In every text comment, the feedback recipient was the board author and not any other peer who had produced feedback previously. In other words, there was no direct communication between the feedback providers on the digital boards. However, there are several cases of indirect communication in form of references to communication within and outside of Padlet (in real life) as well as references to their own experience/knowledge and literature sources. Moreover, sometimes, there was feedback on the feedback received, but usually the feedback providers did not reply to the author's responses.

Most feedback started with a greeting (usually by using the peers' name) and ended with a goodbye. Interestingly, the board that received most feedback was also the one with the most comments without a greeting.

The feedback was provided on different content areas or assessment dimensions. Overall, most feedback was given on topic-related aspects and the research method. There was also

feedback on the purpose/significance of study, research questions, literature/sources, findings, participation, language, and originality.

Moreover, three feedback purposes were identified: Reflection/inspiration, motivation and correction. Most feedback was given with the purpose of reflection/inspiration.

The feedback was categorized as either positive or negative, and specific or non-specific. Both specific and non-specific positive feedback was provided nearly twice as much as negative feedback. No non-specific negative feedback was given, but occasionally the feedback had an unclear tendency as to whether it should be interpreted as positive or negative.

In the feedback comments, the providers mostly used the pronoun “you”, whereas the authors’ responses typically contained “I”. “I” words (I, me, my) were more prevalent in specific positive feedback (M=1.43 occurrences per feedback sequence) than in specific negative feedback (M=0.60). On the other hand, “you” words (you, your*) surfaced almost equally often in the sequences of specific positive (M=2.28) and specific negative feedback (M=2.27). Furthermore, “you” pronouns were used almost 2.8 times more than “I” pronouns in feedback serving the purpose of reflection/inspiration, while their distribution was more balanced for the purposes of motivation and correction.

In comparison with boosters (such as “really”, “very”), linguistic hedges (such as “may”, “assume”, “in my opinion”) were utilized 4.1 times more frequently. Hedges appeared almost equally often in sequences of specific positive and specific negative feedback.

It was outstanding that some feedback providers used smileys/emojis and abbreviations/shortcuts (e.g. “u” instead of “you”) in their comments as well as certain typographical adjustments, with words marked in bold font or written in capital letters.

Usually, the feedback providers did not reply to the author’s response. On the digital boards, there thus did not seem to be much interaction between the peers, with a few exceptions. However, there were three references to communication outside of the Padlet.

We also tried to find correlations between the perceived usefulness as rated by the students in their surveys (e.g. “highly useful”, “slightly useful”), the number of comments received, feedback strategies and the purpose of the feedback. However, we could not find any clear connection purely based on the feedback data. By contrast, the accompanying survey was more revealing. Therefore, both data sources should also be incorporated in future research (see discussion section 5.5).

4.8. Results from the Recorded Feedback Analysis

Subsequent to their literature search, the course participants were asked to create a work plan (WP) and a provisional table of contents (TOC) for their Master or PhD thesis. Altogether, 12 persons contributed to this activity, thereof 8 Master and 4 (1 registered, 3 prospective) doctoral students. In contrast to the previous round, S009 did not participate in this feedback activity (neither as a person uploading documents nor as a feedback provider). Furthermore, S014

only provided feedback but did not receive any because she changed her topic and was thus unable to create a work plan and TOC on time. Moreover, as in the foregoing feedback task, S015 did not engage in the asynchronous feedback phases, but only in the synchronous discussions.

In this section, the results from the analysis of recorded feedback will be presented, starting with a general overview of the files, participants, and codes.

4.8.1. Overview of Recorded Files and Codings

The N=12 participating students formed four peer groups and commented on each other's WP and TOC either by using an audio- or screencast recording. Nobody chose talking-head video feedback, but one person (S002) included the webcam at the beginning of a screen recording as a combination screencast.

In the peer group of S002, S003 and S004, N=2 students (S003 and S004) recorded their feedback in **two separate files**, one for the work plan and one for the table of contents. However, for the analysis of their lengths, the single recordings were summed up. In total, thus, 27 files were obtained, which will be counted as 23 feedback events in Table 39.

Table 39: Overview of Feedback Providers, Feedback Methods and Lengths of Audio-/Screencasts

Feedback recipient	Feedback provider	Feedback method	Length	
S001	S012	Audiocast		00:03:54
	S005	Audiocast		00:04:57
S002	S003 (WP)	Audiocast	00:01:12	00:02:04
	S003 (TOC)	Audiocast	00:00:52	
	S004 (WP)	Screencast	00:03:05	00:03:52
	S004 (TOC)	Screencast	00:00:47	
S003	S004 (WP)	Screencast	00:01:58	00:03:48
	S004 (TOC)	Screencast	00:01:50	
	S002 (WP)	Screencast	00:02:34	00:03:26
	S002 (TOC)	Screencast	00:00:52	
S004	S003	Audiocast		00:01:01
	S002	Screencast		00:01:52
S005	S012	Audiocast		00:03:08
	S001	Audiocast		00:03:42
S006	S007	Audiocast		00:00:43
	S013	Audiocast		00:00:39
S007	S006	Screencast		00:00:31
	S013	Audiocast		00:01:05
S008	S014	Screencast		00:05:40

Feedback recipient	Feedback provider	Feedback method	Length
	S011	Audiocast	00:04:34
S011	S008	Audiocast	00:01:56
	S014	Screencast	00:02:56
S012	S005	Audiocast	00:04:57
	S001	Audiocast	00:02:39
S013	S007	Audiocast	00:00:56
	S006	Screencast	00:01:10
S014	S008	Audiocast	00:01:47
12		**23***	**01:01:17**

Overall, there were 16 audiocasts and 11 screencasts, which were counted as 15 audiocasts and 8 screencasts here. Separate overviews of the audiocasts vs. screencasts are provided in Table 40 and Table 41 for easier reference.

Table 40: Overview of Audiocasts

Feedback recipient	Feedback provider	Feedback method	Length
S001	S012	Audiocast	00:03:54
S001	S005	Audiocast	00:04:57
S002	S003	Audiocast	00:02:04
S004	S003	Audiocast	00:01:01
S005	S012	Audiocast	00:03:08
S005	S001	Audiocast	00:03:42
S006	S007	Audiocast	00:00:43
S006	S013	Audiocast	00:00:39
S007	S013	Audiocast	00:01:05
S008	S011	Audiocast	00:04:34
S011	S008	Audiocast	00:01:56
S012	S005	Audiocast	00:04:57
S012	S001	Audiocast	00:02:39
S013	S007	Audiocast	00:00:56
S014	S008	Audiocast	00:01:47
15			**00:38:02**

Table 41: Overview of Screencasts

Feedback recipient	Feedback provider	Feedback method	Length
S002	S004	Screencast	00:03:52
S003	S004	Screencast	00:03:48
S004	S002	Screencast	00:03:26
S004	S002	Screencast	00:01:52
S007	S006	Screencast	00:00:31
S008	S014	Screencast	00:05:40
S011	S014	Screencast	00:02:56
S013	S006	Screencast	00:01:10
8			**00:23:15**

All in all, 01:01:17h were recorded and analyzed. N=15 out of 23 were recorded as audiocasts with a total length of 00:38:02h, and N=8 as screencasts in 00:23:15h. The mean length of all 23 files was M=02:40min with a calculated standard deviation of 01:32min. On average, an audio file was M=02:32min long (SD=01:34min) and a screencast slightly longer with M=02:54min (SD=01:40min). For easier reference, these findings are summarized in Table 42.

Table 42: Overview of Number, Total and Average Length and Standard Deviation per Recorded Feedback Method

Feedback method	Number	Length	Average length	Standard deviation
Audiocasts	15	00:38:02	00:02:32	00:01:34
Screencasts	8	00:23:15	00:02:54	00:01:40
Total	**23**	**01:01:17**	**00:02:40**	**00:01:32**

To determine whether the differences in length were statistically significant, a two-samples t-test assuming unequal variances was conducted. Since p=0.306 is larger than 0.05, audio- and screencasts can be interpreted as not being significantly different in length.

Nevertheless, the length was critically examined by inspecting the extreme cases. In the current research, 6 audiocasts and 2 screencasts were identified as extreme cases, i.e. those that were shorter than 01:00min (4 cases) and longer than 04:00min (4 cases). When removing these clips from the calculations, the following lengths, means and SDs were obtained (Table 43).

Table 43: Length, Average length and Standard Deviation without Extreme Cases per Feedback Method

Feedback method	Extreme cases	Without extreme cases	Length	Average length	Standard deviation
Audiocasts	6	9	00:21:16	00:02:22	00:01:03
Screencasts	2	6	00:17:04	00:02:51	00:01:06
Total	**8**	**15**	**00:38:20**	**00:02:33**	**00:01:04**

After the removal of the extreme cases, the average length of the remaining 15 files was 02:33min with a smaller standard deviation of 01:04min. For the audiocasts, the mean was 02:22min (SD=01:03) and M=02:51min for the screencasts (SD=01:06).

Generally, the screencasts remained longer than the audiocasts despite the exclusion of extreme cases. Since the extreme cases did not lead to any significantly different tendencies, all 23 feedback cases were considered for further analysis.

After their transcription, all files were analyzed in MAXQDA 22 (VERBI Software, 2021). This resulted in a total of 3,224 codings stretching over the nine major categories shown in Figure 45.

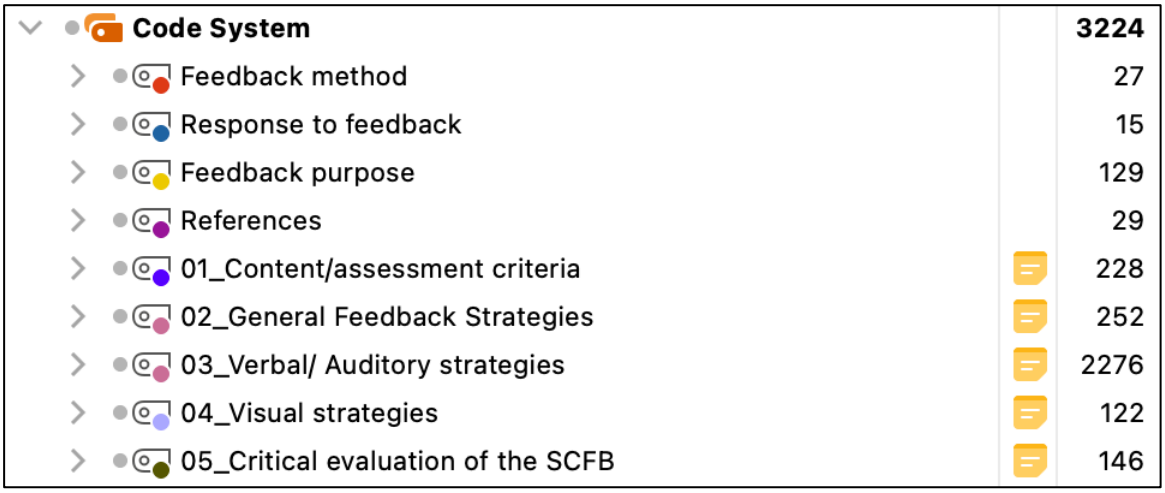


Figure 45: Main Categories in the Analysis of the Recorded Feedback

The five categories that are numbered in Figure 45 stem from a preceding study about peer screencast feedback (cf. Schluer, 2020b; 2021b; 2022b). The remaining four categories were newly added during the current project. Their definitions are provided in Table 44.

Table 44: Main Categories and Definitions Used for the Analysis of Recorded Feedback

Category	Description
From Screencast Feedback Project 2022	
01_Content/assessment criteria	Structural make-up (e.g. introduction, body, conclusion) as well as area or assessment dimension on which

Category	Description
[split into feedback object & structure of feedback in the digital board analysis]	feedback is given in the main part of the recorded message (e.g. research questions and instruments, work plan, word choice and grammar)
02_General Feedback Strategies/ Valence	Positive comments or criticism, e.g. outlining strengths and errors/ areas for improvement (with varying degrees of detail)
03_Verbal/auditory strategies	Use of language (e.g. utilization of hedges/ boosters, pronouns, sentence types) and/or sound cues, e.g. to direct the feedback recipient's attention
04_Visual strategies	Visible visual aspects on the screen (e.g. scrolling, highlighting), e.g. use of visual cues to direct the feedback recipient's attention
05_Critical evaluation of the screencast feedback *[called assessment of the feedback in the digital board analysis]*	Critical analysis and assessment of the feedback from the researcher's perspective
New Categories (compared to an earlier SCFB study)	
Feedback method	Type or format of the recorded feedback (e.g. audio- or screencast)
Feedback purpose	The feedback function or likely intention pursued by giving feedback (e.g. to motivate or correct)
References	Mentioning sources, personal knowledge or experiences (e.g. work experience or the feedback provider's own thesis) as well as prior conversations (with the feedback recipient or another peer), e.g. for relationship building
Response to feedback	Recipient's reply to the feedback and its structural composition as well as linguistic characteristics, e.g. thanking for feedback or explaining uncertainties

As the last category implies, there was one student (S003) who responded to the feedback by creating two audiocasts herself. The relevant codings will be analyzed separately in section 4.8.10. The remaining codings were distributed across the feedback files as follows (Table 45).

Table 45: Overview of Codings per Audiocast and Screencast

Feedback recipient	Feedback provider	Feedback method	Codings		
			Per file		Total
S001	S012	Audiocast	209		428
	S005	Audiocast	219		
S002	S003 (WP)	Audiocast	67	111	308

Feedback recipient	Feedback provider	Feedback method	Codings		
			Per file		Total
	S003 (TOC)	Audiocast	44		
	S004 (WP)	Screencast	143	197	
	S004 (TOC)	Screencast	54		
S003	S004 (WP)	Screencast	103	215	401
	S004 (TOC)	Screencast	112		
	S002 (WP)	Screencast	122	186	
	S002 (TOC)	Screencast	64		
S004	S003	Audiocast	58		165
	S002	Screencast	107		
S005	S012	Audiocast	163		331
	S001	Audiocast	168		
S006	S007	Audiocast	43		91
	S013	Audiocast	48		
S007	S006	Screencast	31		95
	S013	Audiocast	64		
S008	S014	Screencast	299		523
	S011	Audiocast	224		
S011	S008	Audiocast	88		278
	S014	Screencast	190		
S012	S005	Audiocast	218		337
	S001	Audiocast	119		
S013	S007	Audiocast	56		131
	S006	Screencast	75		
S014	S008	Audiocast	71		71
12		**23**			**3,159**

In the 23 (or rather 27 separate) files, a total of 3,159 codings were applied, which equaled M=137.35 codings on average. Audiocasts were coded 1,859 times in total with a mean of 123.93 codings per file. Screencasts received 1,300 codings in total, with M=162.50 (see Table 46). The t-test results, however, yielded p=0.473, which is larger than 0.05. Consequently, audio- and screencasts can be interpreted as not being significantly different in their overall codings.

Table 46: Overview of Total and Average Codings per Recorded Feedback Type

Feedback method	Number	Total codings	Average codings
Audiocasts	15	1,859	123.93
Screencasts	8	1,300	162.50
Total	**23**	**3,159**	**137.35**

Moreover, it is worth noting that both extreme files were screencasts. The file with the most codings (N=299 codings in total) was the screencast for S008 produced by S014. With 05:40min, it was also the longest file. Likewise, the shortest file (00:31min), i.e. S006's screencast for S007, contained the least codings (N=31 codings). A detailed overview of the lengths and codings is given in Table 47 (therein, S003's and S004's two files count as one file each).

Table 47: Distribution of Codings per Length of Recorded Feedback File

Feedback recipient	Feedback provider	Feedback method	Codings per file	Length (hh:mm:ss)	Length (minutes)	Codings per minute
S001	S012	Audiocast	209	00:03:54	3.90	53.59
	S005	Audiocast	219	00:04:57	4.95	44.24
S002	S003 (WP)	Audiocast	111	00:02:04	2.07	53.71
	S003 (TOC)	Audiocast				
	S004 (WP)	Screencast	197	00:03:52	3.87	50.95
	S004 (TOC)	Screencast				
S003	S004 (WP)	Screencast	215	00:03:48	3.80	56.58
	S004 (TOC)	Screencast				
	S002 (WP)	Screencast	186	00:03:26	3.43	54.17
	S002 (TOC)	Screencast				
S004	S003	Audiocast	58	00:01:01	1.02	57.05
	S002	Screencast	107	00:01:52	1.87	57.32
S005	S012	Audiocast	163	00:03:08	3.13	52.02
	S001	Audiocast	168	00:03:42	3.70	45.41
S006	S007	Audiocast	43	00:00:43	0.72	60.00
	S013	Audiocast	48	00:00:39	0.65	73.85
S007	S006	Screencast	31	00:00:31	0.52	60.00
	S013	Audiocast	64	00:01:05	1.08	59.08
S008	S014	Screencast	299	00:05:40	5.67	52.76
	S011	Audiocast	224	00:04:34	4.57	49.05
S011	S008	Audiocast	88	00:01:56	1.93	45.52
	S014	Screencast	190	00:02:56	2.93	64.77
S012	S005	Audiocast	218	00:04:57	4.95	44.04
	S001	Audiocast	119	00:02:39	2.65	44.91
S013	S007	Audiocast	56	00:00:56	0.93	60.00
	S006	Screencast	75	00:01:10	1.17	64.29
S014	S008	Audiocast	71	00:01:47	1.78	39.81
12		**23**	**3,159**	**01:01:17**	**61.28**	**51.55**

Table 47 shows that the average number of codings of all files was 51.55 per minute. With M= 44.04, the least codings per minute were in the audiocast by S005 created for S012 (218 codings in 00:04:57). By contrast, the most codings per minute were found in the audiocast to S006 produced by S013 (48 codings in 00:00:39) with M=73.85.

4.8.2. Feedback Method

Since students were free to choose the type of recording for their feedback, the mode and method of feedback was likely to vary. Indeed, the N=12 participating students produced 16 audiocasts and 11 screencasts overall. One screencast video was found to be a talking-head video, but the video image appeared for only 00:10min in the introductory part (see Figure 46).

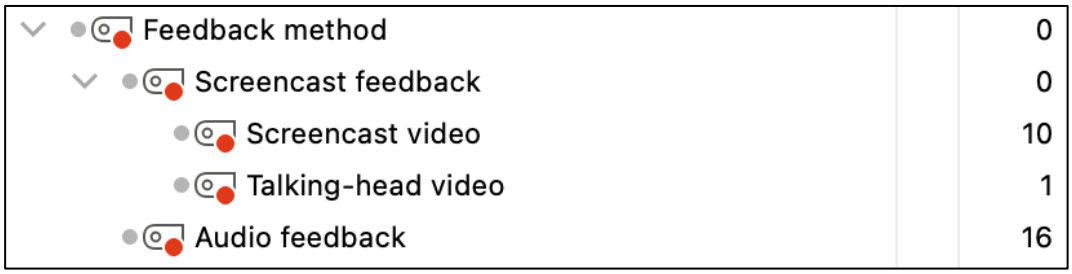


Figure 46: Codings of Digitally Recorded Feedback Method

As detailed in Table 45 and Table 47 above, N=5 students exclusively produced audio feedback, N=1 student only screencast feedback, and N=6 students created audio feedback for one of their peers and screencast feedback for the other.

In contrast to the analysis of the video lengths (see previous section 4.8.1), every transcript of the audio-/ screencasts was coded as such in this category, i.e. the two files created by S003 and S004 were coded separately.

4.8.3. Feedback Purpose

During the qualitative analysis, N=4 purposes were identified: motivation, reflection/inspiration, correction, and reassurance for correct understanding (see Figure 47).

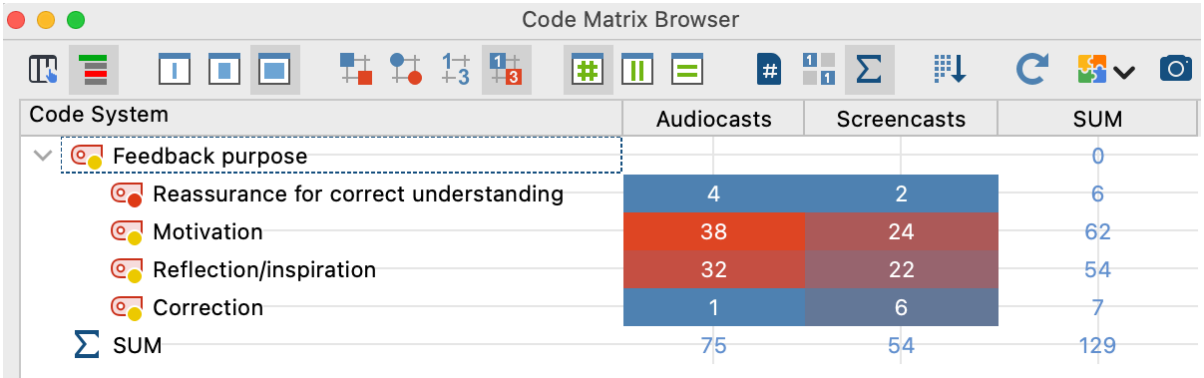


Figure 47: Code Matrix Browser of Feedback Purpose in Audiocasts and Screencasts

The red dot next to the code name of "Reassurance for correct understanding" indicates that it is a new code[11] which had not yet been present in the analysis of feedback on digital boards. Also, this category did not appear in the screencast feedback analyses from foregoing years (Schluer, 2021b; 2022b). In some of the current recordings, though, the peers sought reassurance about their understanding of the submitted WP and TOC.

Furthermore, Figure 47 shows that motivation was the main purpose identified in the recorded feedback (N=63), closely followed by reflection/inspiration (N=54). Correction only appeared in N=6 instances, mostly in screencasts.

To inquire into the occurrence of motivation as the major feedback purpose in different feedback segments, a code relations browser was run that is depicted in Figure 48.

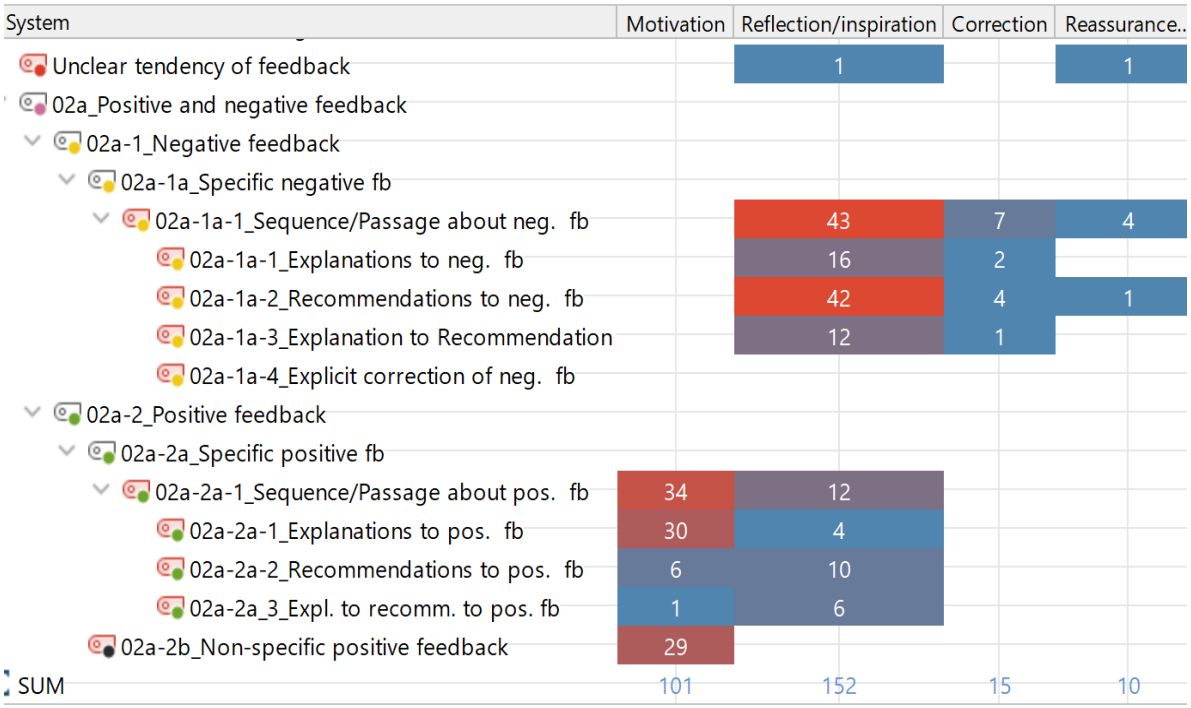


Figure 48: Code Relations Browser of Feedback Purposes and General Feedback Strategies

Noticeably, motivational feedback was coded similarly often in specific (34 times) and in non-specific positive feedback (29 times). Furthermore, every sequence of non-specific positive feedback seemed motivational. Some examples of motivational and specific positive feedback can be found here:

> "I think your research questions are very clear. You know what you are doing and that's very important that there is no confusion there." (Screencast to S003 by S004, 00:06min)

> "I really like your research plan because it is very systematic and it is organized in a very good order." (Audiocast to S002 by S003, 00:03min)

[11] Throughout the coding process, newly added categories were marked in red in the code system.

The excerpt below provides more contextual details (Figure 49). It illustrates how S012 gave motivational feedback (marked in yellow) after having posed questions for clarification and reflection and before she established personal references and engaged in relationship-building.

(02:06)
Or how are you planning to do that? And then also I was wondering if you are giving them any examples of movies that could be included or how erm materials, tasks or exercises could look like if it [sic] would be integrated into erm language learning materials. So yeah, this is really something I would like to know. Other than that, I think it's really great that you have already planned out your schedule and your time. Because this is very great for time management and breaking up everything into parts and when you want to finish them.

(02:36)
It really helps me for instance with .. time management and to make [sic] my project more feasible because otherwise, you might get overwhelmed. So it's great that you have already finished that. .. Yeah, other than that, I don't really know what .. to .. tell you ((laughs)) besides that it is interesting, and if you were done with your project, I would love to read it. So besides that, have a lovely week and see you soon.

Figure 49: Audiocast Excerpt Provided to S005 by S012 (02:06min)

In the second to last sentence, we can find a phrase that frequently occurred in the recorded files, especially in non-specific positive feedback, namely that the topic was considered interesting (see also the digital board analysis in section 4.7.9). Two further instances from the initial, non-specific feedback sequences are listed below:

> "Hi S006, I looked through your research plan and I wanna say that.. the topic is really interesting, I like it." (Audiocast to S006 by S013, 00:00min)

> "Hello S007. I've just looked through your master thesis work plan. Erm, first of all, I wanna tell you that the topic is very interesting." (Audiocast to S007 by S013, 00:00min)

By contrast, there was no sequence of negative feedback with a motivational purpose. Instead, negative feedback was mostly given with the purpose of reflection/inspiration (43 sequences) as well as correction (N=7) and reassurance for correct understanding (N=4). Here is an example of specific negative feedback with the purpose of reflection/inspiration (Figure 50):

(00:23)
((scrolls down and new page appears)) .. In [sic] your research questions are a bit broad. For instance, how do you plan to find answers for the third questions [sic]? What are the challenges of internalization [sic] of German university curricula?

(00:37)
How many German universities would you like to examine? And you can maybe narrow it down so it can be easier for you.

Figure 50: Screencast Excerpt Provided to S013 by S006 (00:23min)

Moreover, we find examples of reassurance for correct understanding in the following excerpts:

> "And when I ((scrolls up)) look at your research questions though, erm .. you're trying to see the effect on an [sic] students' writing skills ((cursor circles the word "writing skills")) – sorry the improvement in students' writing skills. But when I see ((scrolls down)) your study method here, erm, you're erm, basically suggesting to measure students' erm perception, right? So ((cursor circles the phrase "attitudes towards using the subject of the paper") their attitudes towards using the subject of the paper, right? […]" (Excerpt from Screencast Feedback Provided to S002 by S004, 00:30min)

> "[…] As I get from your topic, if I'm not wrong, you want to give synchronous feedback […]" (Excerpt from Audiocast Feedback Provided to S004 by S003, 00:05min)

In both examples, the feedback provider was not sure whether they had understood the peer's topic/plan correctly. They signaled this uncertainty by asking "right?" and saying "if I'm not wrong".

4.8.4. References

The category "references" comprises statements about personal experience or prior communication or other peer's work (within their peer group of 3 students). Most of the students knew each other from the seminar or from the English Department and seem to have had conversations about their theses beforehand. Altogether, N=6 different types of references were identified in 29 instances. More precisely, they referred to students' own prior experiences (N=10) in general or to their work experience (as a teacher) in particular (N=3), to their knowledge (N=4) or thesis (N=4), to prior communication with the peer (N=7) and to other peer's work in one case. With regard to the latter, it is noticeable that one student (S004) referred to both peer's work (S002) while giving feedback (to S003). The detailed breakdown per feedback type is displayed in Figure 51.

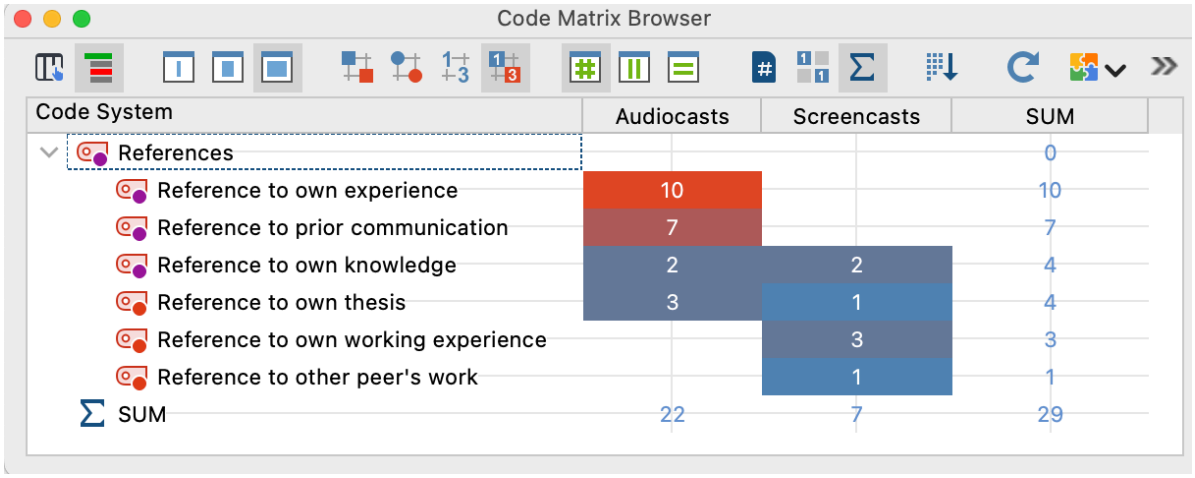


Figure 51: Code Matrix Browser of Reference Types in Audiocasts and Screencasts

For example, in the following audiocast excerpt, S012 referred to S001's Padlet and shared some personal experience related to her thesis topic.

> "[…] So .. this is very interesting because especially at TU Chemnitz I have met lots of Chinese students and [their] culture is very fascinating and interesting to me. However, I do not really know much about it and definitely don't know much about specific differences when it comes to politeness, directness, social norms, or behaviors. So, this is definitely something all of the students participating could really benefit from. And the only thing I do know is that when you are invited to dinner at a Chinese household, you shouldn't eat up because then it means that they didn't prepare enough food. That's something erm a friend of mine told me when I was invited to her ((laughs)) parents' house. So yeah, that's the really only thing I know." (Audiocast to S001 by S012, 00:23min)

In another instance, S012 complimented S005 on her well-organized work plan and stressed the importance of good time management based on her own experience (for contextual details see Figure 49):

> "It really helps me for instance with .. time management and to make [sic] my project more feasible because otherwise, you might get overwhelmed." (Audiocast to S005 by S012, 02:36min)

With regard to knowledge, S014 emphasized that S008 should consider more time for her interviews deriving from her knowledge about the process of conducting interviews:

> "[…] I don't think you will be able to fit all of this into the four weeks, especially because the more people are involved, and they usually are with interviews- the more people are involved, the longer things take." (Screencast to S008 by S014, 03:31min)

The next one is an outstanding example because none of the other students mentioned that they would use some other peer's knowledge in their own thesis:

> "And erm .. it will definitely help me to shed my own ideas about my ((giggles)) research [sic] table of contents, erm so thank you for that." (Screencast to S002 by S004, 00:13min)

Another exceptional case is S003's reference to S002's work plan (who is their 3rd group member) when she gave screencast feedback on S004's work plan (Figure 52):

(00:36)
Erm when I looked at S002's erm work plan, for instance, erm she had a very specific reference. So .. perhaps erm .. it could help me to understand better ((moves cursor downward unintentionally)), of course for you also, not just for me or for anybody else, to see erm how your research will contribute to the existing body of literature already, and … ((moves cursor unintentionally)) that's the only thing.

Figure 52: Reference to Peer Work in the Screencast Feedback Provided to S003 by S004 (00:36min)

Some students even included several different references in their recorded feedback, such as in S005's audiocast to S012. Firstly (starting from 00:05min), S005 referred to prior communication and his already mentioned excitement about S012's topic (in the Padlet), and secondly, he referred to his own experience of being a learner of English as a foreign language from a specific sociocultural context. Finally, S005 cited an earlier opinion (mentioned in the Padlet) on what S012 should include in her thesis (04:04min).

4.8.5. Feedback Objects/ Contents (Assessment Criteria)

In the "content/assessment criteria" category, the structural composition and content of the audio- and screencasts were coded. Structurally, the main subdivision was made into introduction, evaluative summary as preview, the main feedback in the body, and the conclusion (see Figure 53).

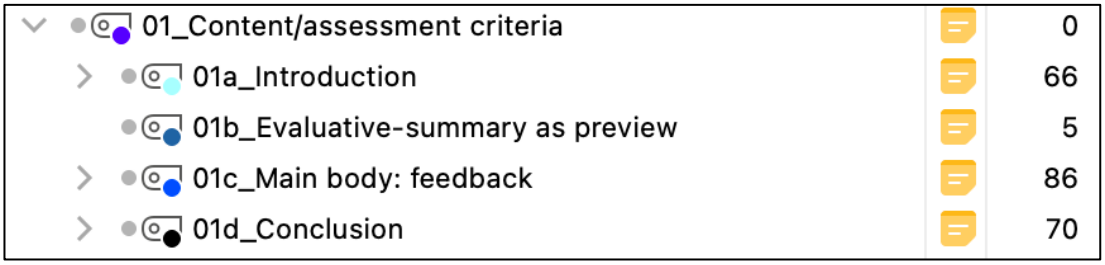


Figure 53: Codings of Feedback Content/ Assessment Criteria in Recorded Feedback

The next sections will look at the different parts in more detail, starting with the introduction.

4.8.5.1. Introduction

The **introduction** of the audio- and screencasts usually started with a greeting (in 26 cases), with only one exception: In the screencast feedback on S003's Table of Contents, S004 did not include a greeting formula at the beginning. Depending on the (unknown) order in which she recorded her feedback files, this might be because she had already included a greeting in the work plan feedback.

The N=27 codings of greetings already accounted for 40.9% of all codings in the introductory part. The remaining 39 codings were distributed as follows: Three existing categories from the former Screencast Feedback (SCFB) project (Schluer, 2021b; 2022b) recurred in the current dataset (with N=5 occurrences each), which are the specification of the feedback as audio- or screencast (in 5 cases), thanking (N=5), and giving an overview of the structure or rather "clarifying discussed points" of the audio-/screencast (N=5). Several former codes, however, did not surface in the present feedback, as the numerous zero codings in Figure 54 show.

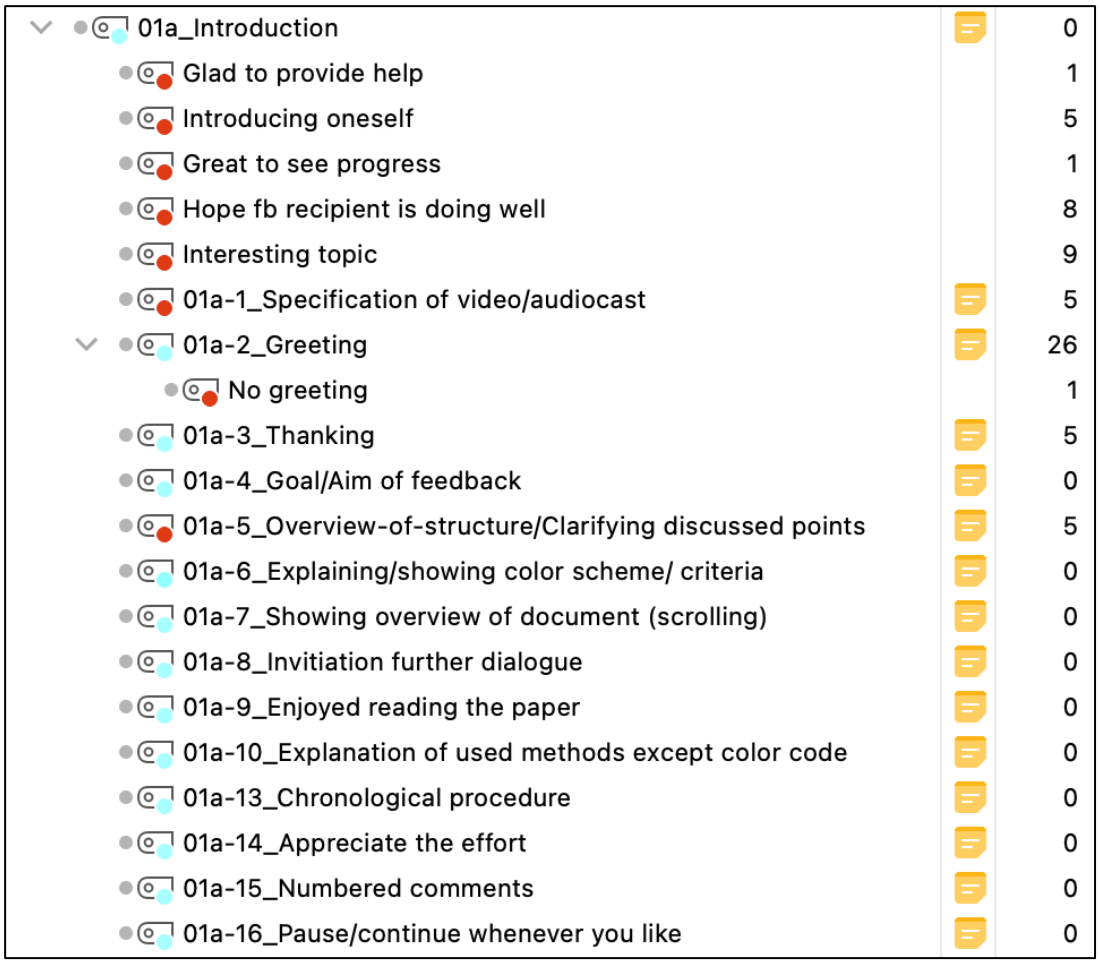


Figure 54: Overview of Codings in the Introductory Parts of Recorded Feedback

Conversely, several new categories were added inductively, as indicated by the red code color and the lacking enumeration in Figure 54, i.e.

- stating that the topic is interesting (N=9)
- hoping that the feedback recipient is doing well (N=8)
- introducing oneself (N=5)
- being happy to see progress (N=1)
- being glad to provide help (N=1)

Since the previous screencast feedback project was conducted in an anonymous manner, it is reasonable that several of the above codes newly emerged in the present non-anonymous peer scenario. Notably, relational work becomes evident in them. Also, in the foregoing screencast study, feedback was offered only once, i.e. without any additional feedback cycles. Conversely, the multiple feedback opportunities in the current implementation make progress feedback possible.

Commonly, several categories applied to each introduction, as exemplified in Figure 55 and Figure 56.

(00:00)
Hi S008. My name is S011. I would like to start by briefly introducing myself. I'm a third-semester master student in [sic] .. TU Chemnitz. And thank you very much for giving me this opportunity. I'm very happy and excited to give you feedback.

(00:15)
I love the topic you've chosen and .. it's a really interesting topic is [sic] how humor can affect [sic] (the) teaching erm and learning process. I'm curious how you're going to evaluate and measure this and how you're going to gather your informations [sic] and erm I am also curious about the questions you will prepare for the interview.

Figure 55: Introduction of Audiocast Feedback Provided to S008 by S011 (00:00min)

In Figure 55, S011 greeted S008 by using her name (yellow), introduced herself (green), thanked for the opportunity of giving feedback (pink) and said that she found the topic interesting (red).

(00:00)
Hi, S005, erm this is S001. I'm commenting ((giggles)) on your work plan of your master thesis again erm as we have done last year. Yeah, my current focus is on .. the first column stated on [sic] your work plan. It's called develop research question.

Figure 56: Introduction of Audiocast Feedback Provided to S005 by S001 (00:00min)

In turn, in Figure 56, S001 greeted S005 by using his name (yellow), introduced herself (green), specified the method (blue) and clarified her focus of the points she was about to discuss (red).

4.8.5.2. Evaluative Summary

Closely following the introductory words, N=5 students previewed the subsequent contents by means of an **evaluative summary**. While more than half (N=35 of 64) of the SCFB files in the earlier project (Schluer, 2021b; 2022b) contained such an evaluative summary, merely N=5 feedback providers gave such a preview, which was also remarkably shorter than in the foregoing study. This might also result from the shorter overall length and the more spontaneous, conversational nature of the audio-/screencasts in the current study. Interestingly, N=4 out of the five evaluative summaries occurred in the screencasts and only one in an audiocast (to S008 by S011). Two examples from the present study serve to illustrate the use of an evaluative summary (Figure 57 and Figure 58). Both are very positive about the submitted files and projects.

(00:00)
Hi, S002. Erm I went through your ((scrolls down)) work plan and ((scrolls down)) overall erm ((scrolls down)) I had a very clear idea what you're trying to do ((scrolls down)) because of the recent study ((cursor circles the word “Research gap”)) you included here an [sic] information about. So I can see how you're trying to expand the scope of the research that has already been done and and I think your purpose is very legit and-

Figure 57: Evaluative Summary in the Screencast Feedback to S002 by S004 (00:00min)

(00:11)
I .. would like to say ((scrolls down)) very upfront that I really think that you've ((scrolls down)) thought this through already ((scrolls down and a new page appears)), I like that. I like the overview erm that you've provided of .. literature that erm .. comes from different research fields and theories that you would like to erm review and consider before going into the erm into the research part of your thesis. I think that's amazing, erm very good job on that ((scrolls down)).

(00:36)
Erm and also erm that you already include the research gap, the challenges, the implications erm. That already gives a very good overview of what you're really trying to do, and I- I think that's amazing.

Figure 58: Evaluative Summary in the Screencast Feedback to S011 by S014 (00:11min)

4.8.5.3. Main Part

Based on the coding experiences gained in the SCFB study (Schluer, 2021b; 2022b), a distinction between three major assessment dimensions of form, content, and language was made. Whereas in the foregoing project, mainly feedback on language and form was given, participants placed the feedback focus on content in the current study. This noticeable difference between the two data sets becomes obvious by comparing the codings shown in Figure 59 and Figure 60.

01c_Main body: feedback	0
01c-1_Feedback on FORM	234
01c-2_Feedback on CONTENT	130
01c-3_Feedback on LANGUAGE	272

Figure 59: Coding of Feedback Contents in the Screencast Feedback Project (Schluer, 2021b; 2022b)

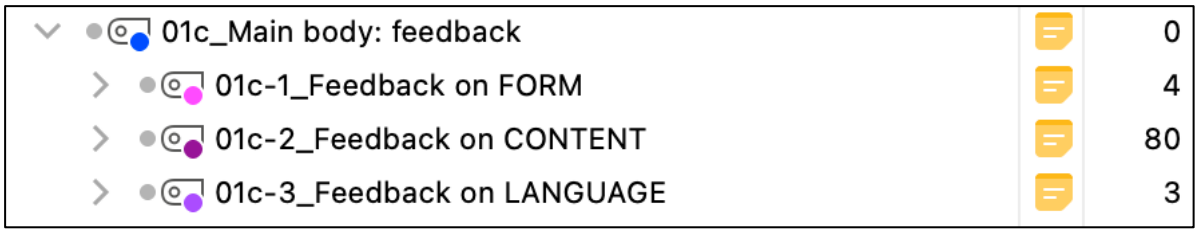


Figure 60: Coding of Feedback Contents in the Current Study of Recorded Feedback

While the previous project solely focused on screencast feedback, the current one additionally considered audio feedback. It is therefore important to look at the distribution of codings separately before more definite conclusions can be drawn.

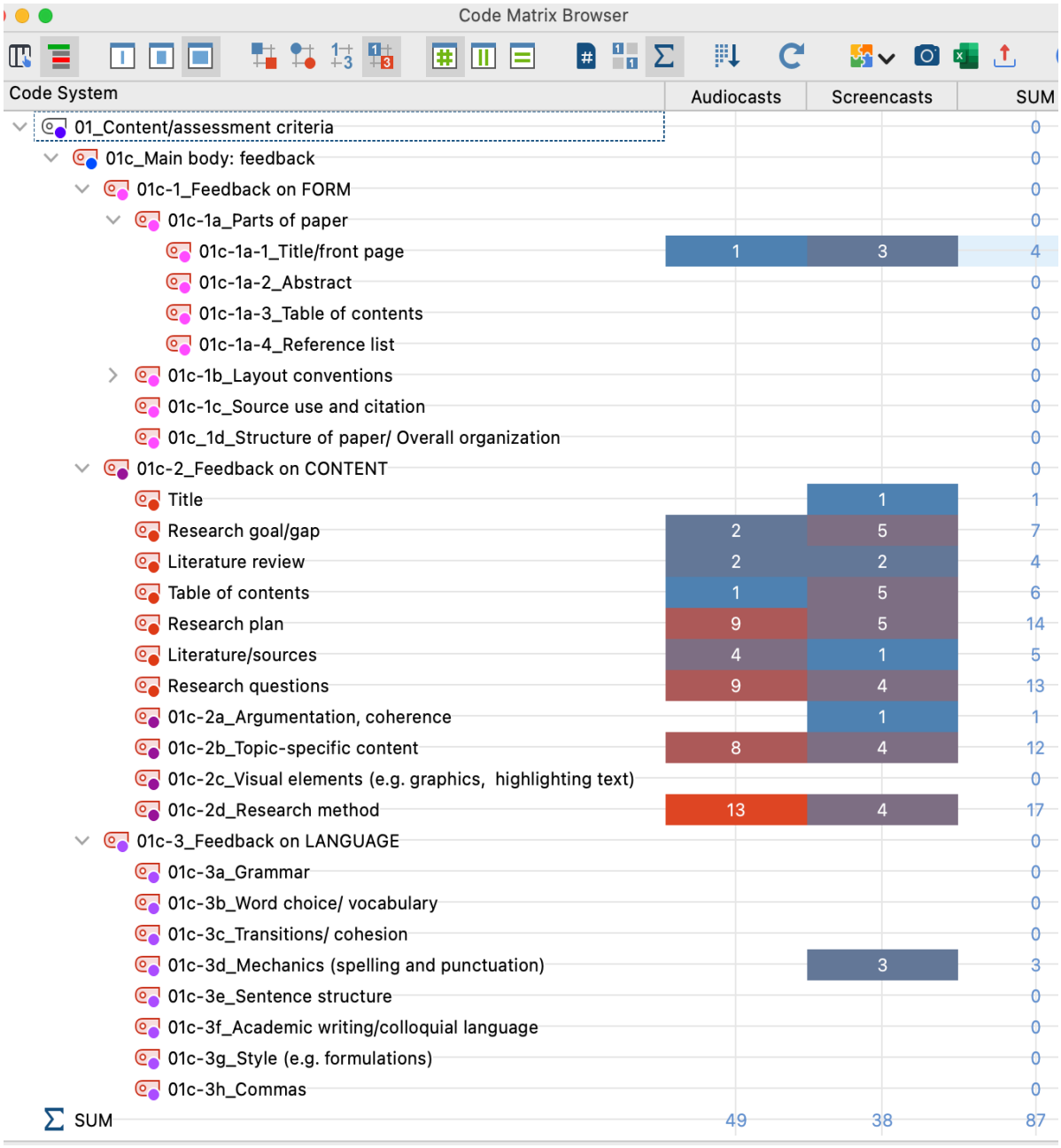


Figure 61: Code Matrix Browser of Audio- and Screencasts and Main Body of Feedback

As can be seen in the Code Matrix Browser in Figure 61, the audiocasts focused mainly on content-related feedback, while the form of the title page was mentioned just once. In the screencasts, most feedback providers likewise concentrated on content-related aspects, but sometimes also mentioned feedback on form and language (N=3 occurrences each). Since these are absolute numbers, the averages are additionally shown in Table 48.

Table 48: Feedback Object per Audio-/Screencast on Average and in Total

Content	Audiocasts		Screencasts		Total	
	Total	Average	Total	Average	Total	Average
Research method	13	0.81	4	0.36	17	0.63
Research plan	9	0.56	5	0.45	14	0.52
Research questions	9	0.56	4	0.36	13	0.48
Topic-specific	8	0.50	4	0.36	12	0.44
Research goal/gap	2	0.13	5	0.45	7	0.26
Table of contents	1	0.06	5	0.45	6	0.22
Literature/sources	4	0.25	1	0.09	5	0.19
Literature review	2	0.13	2	0.18	4	0.15
Title/front page (form)	1	0.06	3	0.27	4	0.15
Mechanics (language)	0	0	3	0.27	3	0.11
Title (content)	0	0	1	0.09	1	0.04
Argumentation	0	0	1	0.09	1	0.04

Most feedback was about the research method (in total N=17; M=0.63), the research plan (in total N=14; M=0.52) or the research questions (in total N=13; M=0.48) and topic-specific aspects (in total N=12; M=0.44). On average, these categories applied more to audiocasts than to screencasts, as Table 48 reveals. Additionally, in the screencasts, the following contents were commented on more frequently: research goal/gap (M= 0.45), table of contents (M=0.45), title/front page (M=0.27). Also, there were N=3 categories to which feedback was given in the screencasts only: mechanics (M=0.27), title (content) (M=0.09), and argumentation (M=0.09).

The length and comprehensiveness of the feedback sequences varied. Some were short, as this positive comment on the research questions:

> "I think your research questions are very clear. You know what you are doing and that's very important that there is no confusion there." (Screencast to S003 by S004, 00:06min)

Others were more elaborate, as in this feedback for reflection on the research method (Figure 62):

(00:50)
Erm.. I don't really know what to say exactly. I just wanna give ((laughs)) you some questions. I'm just gonna shoot them your way, and maybe they help you and they are some food for thought. So I was wondering - you're planning to do a survey or a questionnaire with students, so is your study based on asking them if they would be motivated when films or TV shows would be incorporated in school?

(01:18)
Or .. do you- what exactly are the questions you want to ask in order to find out if such shows trigger motivation in language learners? I was really wondering how you are going to ask this. And then also how do you define motivation?

(01:35)
It's obviously something that you based on the literature you have read and then you build your own conceptualization of motivation. However, the participants of the survey might have very different understandings ((laughs)) of motivations. For some, it might be, "oh cool, we watch a movie", so this is motivating ((laughs)). But yeah, they ((laughs)) might understand it a little bit different. So I was wondering if you are providing them with some kind of guideline on how to understand motivation?

(02:06)
Or how are you planning to do that? And then also I was wondering if you are giving them any examples of movies that could be included or how erm materials, tasks or exercises could look like if it [sic] would be integrated into erm language learning materials. So yeah, this is really something I would like to know. Other than that, I think it's really great that you have already planned out your schedule and your time. Because this is very great for time management and breaking up everything into parts and when you want to finish them.

Figure 62: Audiocast Excerpt Provided to S005 by S012 (00:50min)

Furthermore, the distribution of the feedback objects in positive vs. negative feedback was examined via a Code Relations Browser depicted in Figure 63. The chart shows that specific negative feedback was mainly given on the research method (N=21 sequences), whereas most specific positive feedback was provided on the topic (N=12). Non-specific positive feedback was predominantly given on the research plan (N=6).

Feedback on form occurred in only N=4 instances, all of which were specific negative feedback comments and dealt with the title/cover page. Here are two examples in which the forgotten title was mentioned. In one case, it was very brief: “I just want to mention erm that you forgot to write [sic] title of your topic in the research plan, just so you know” (Audiocast to S006 by S013, 00:08min). In another one, it was more elaborate:

> “Erm so first of all, erm your research topic is interesting, but you didn’t write your thesis title in [sic] the first page, here. Erm so it was not clear for me .. erm erm ..at the beginning .. and ((scrolls down)) until I have read the second page. And erm there’s the thesis title ((new page appears: “Thesis Title: […]”)). Erm you mentioned an explanation of what you are going to do .. and that was clear ((moves the page to the right)). But you need to ((scrolls down)) .. to .. write your title.” (Screencast to S003 by S002, 00:10min)

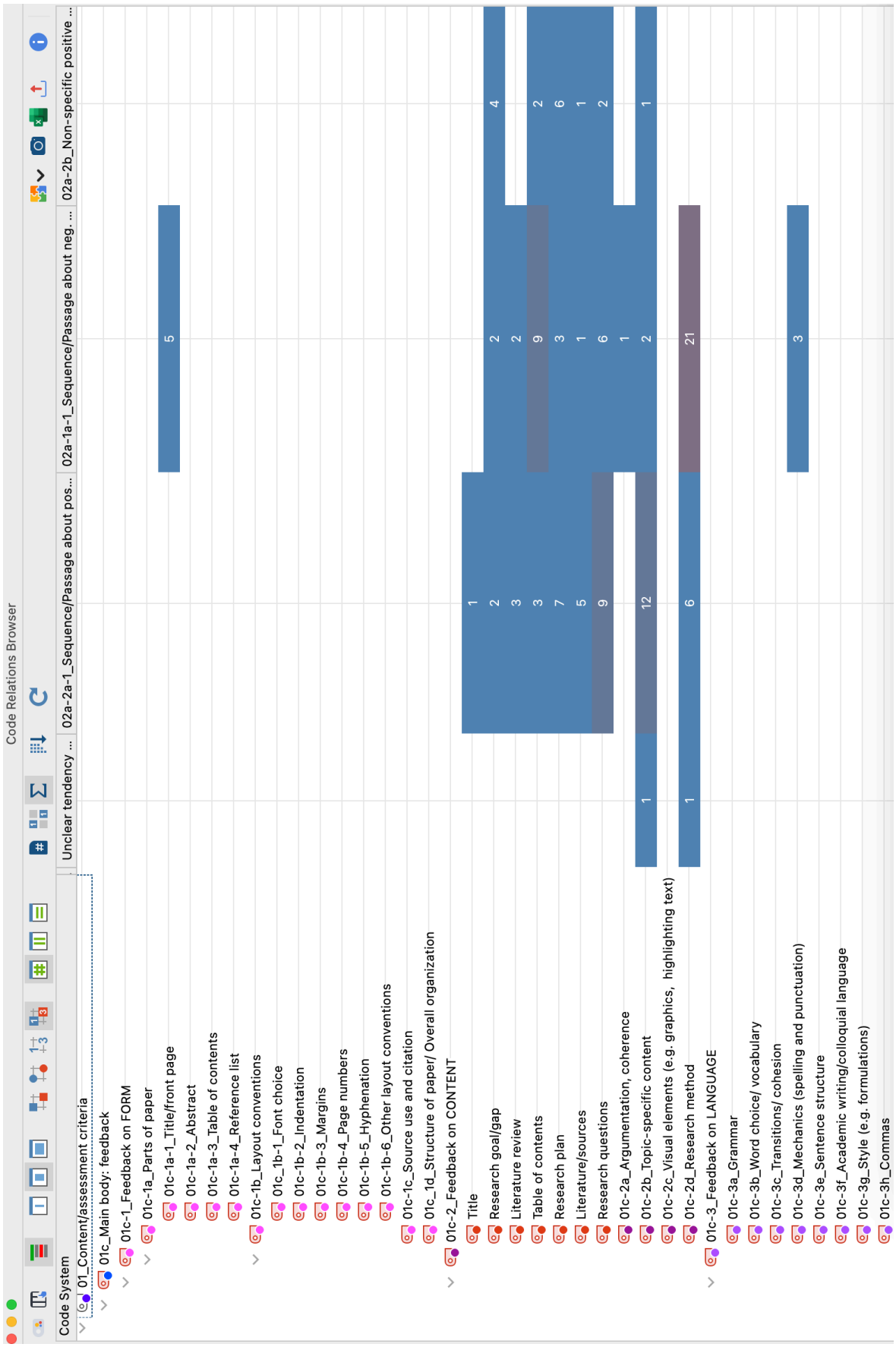


Figure 63: Code Relations of Feedback Contents in the Main Body and Positive/ Negative Feedback

Interestingly, in the foregoing SCFB project (Schluer, 2021b; 2022b), feedback on the title and TOC mostly related to their *form* rather than to their *content*. In the current study, there was, however, one instance in which the title content was problematized, as it sounded more like a research question rather than as a title (first paragraph in S006's screencast feedback directed at S013). Beyond the title as a content aspect (N=1), several other new subcategories emerged in the present work (marked in red in Figure 61 and Figure 63), including feedback on the

- research plan (N=14)
- research questions (N=13)
- research goal/gap (N=7)
- table of contents (N=6)
- literature/sources (N=5)
- literature review (N=4)

The expansion or shift in feedback foci most likely resulted from the difference in the assignment type: While in the preceding SCFB study (Schluer, 2021b; 2022b), the peers provided feedback on term paper drafts, which were often theoretical or analytical in nature, the drafts under current review were content outlines and work plans of the peers' research projects.

Finally, by turning to feedback on language, we note that it exclusively addressed feedback on mechanics, with only N=3 occurrences in total. The remaining linguistic categories (taken from the SCFB project by Schluer, 2021b; 2022b) did not occur at all, as Figure 64 demonstrates.

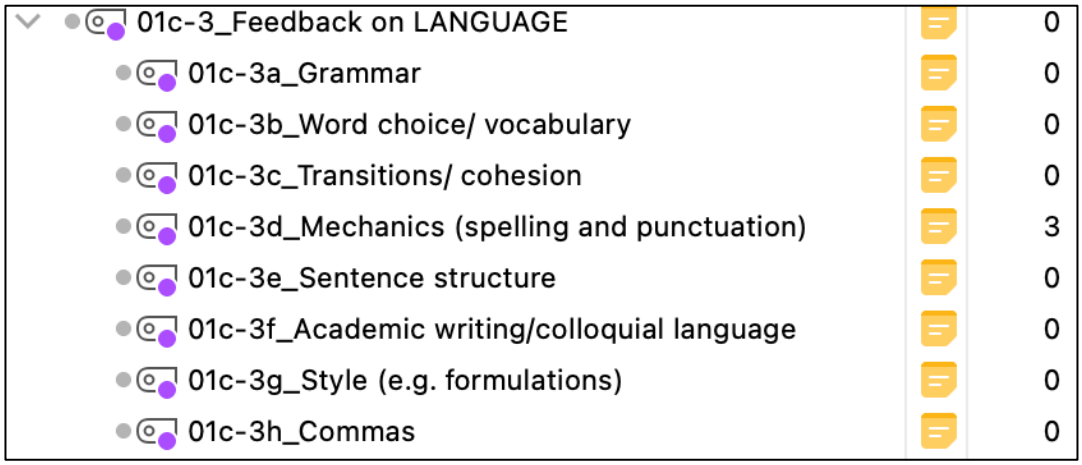


Figure 64: Coding of Feedback on Language in Recorded Feedback

A probable reason is that proper writing was not yet seen as primary at this early draft stage, since the contents often had not (yet) been formulated in full sentences. Moreover, all three codings about mechanics came from the screencasts, whose visual channel allowed for linguistic and formal pinpointing. Two of the three linguistic codings stemmed from S002, who

mentioned two minor mechanical issues in S004's work plan. First, concerning her title and second, a grammatical lapse (probably a typo):

> "I think you have to capitalize every first alphabet [sic, word choice] of each word on [sic] your title." (Screencast to S004 by S002, 00:15min)

> "Erm, this is ((scrolls down)) on the first page and erm on the second page ((a new page appears)) erm, you wrote "my plan has, unfortunately, is not complete", so you don't need to write "has"." (Screencast to S004 by S002, 00:20min)

The third coded passage stressed the importance of using the same English variety throughout the whole paper (see yellow highlights in Figure 65).

(04:24)
((Scrolls down)) And there is not really much ((cursor moves unintentionally)) that I can say about this yet ((scrolls up)) ((laughs)), since it's only just the table of contents ((cursor moves unintentionally)). Just one thing ((scrolls to the tool menu in the down left)) that I realized is here in the literature review as well, but it's more a consistency ((draws a red rectangle around the word "humor" in point 2.1)) point, is, you spell "humor" usually ((draws a red rectangle appears around the word "humor" in point 2.3)) as you spell it here with just the "o", which is the American variant ((cursor moves to the tool menu in the down left)), but then here at 2.2 ((draws an orange rectangle around the word "humour's")) you spell it "humor" with "ou" ((cursor moves unintentionally)).

(04:54)
And also here ((draws an orange rectangle around the word "marginalisation")), the "marginalization" spelt with an "s" is also the British variant ((cursor moves downward unintentionally)). And you know, just remember that consistency is key. You seem to have chosen American English in general because you usually spell "humor" with just the "o", but just make sure to stay consistent here ((cursor moves downward)) and..

(05:13)
Yeah, be clear and just read through everything again and make sure that you stay within one English variety ((cursor presses "clear the screen")) during the writing of your thesis and the preparation of your thesis ((red and orange rectangles disappear)).

Figure 65: Screencast Feedback Provided to S008 by S014 (04:24min)

In fact, pointing out such inconsistencies at an early stage may help to avoid lengthy editing towards the end of the writing process. Generally, though, corrective feedback rarely occurred in the current study, which might have resulted from the nature of the reviewed documents and the commentator's feedback focus.

4.8.5.4. Conclusion

With N=70 codings, the conclusion of the audio-/screencasts received a similar amount of codings as the introduction (N=66). However, while virtually each feedback file contained a greeting, a goodbye was included in N=16 cases (i.e. 59.3%) only. Furthermore, best wishes or good

luck wishes were provided almost equally often (N=17, 63.0%). More details are given in Figure 66.

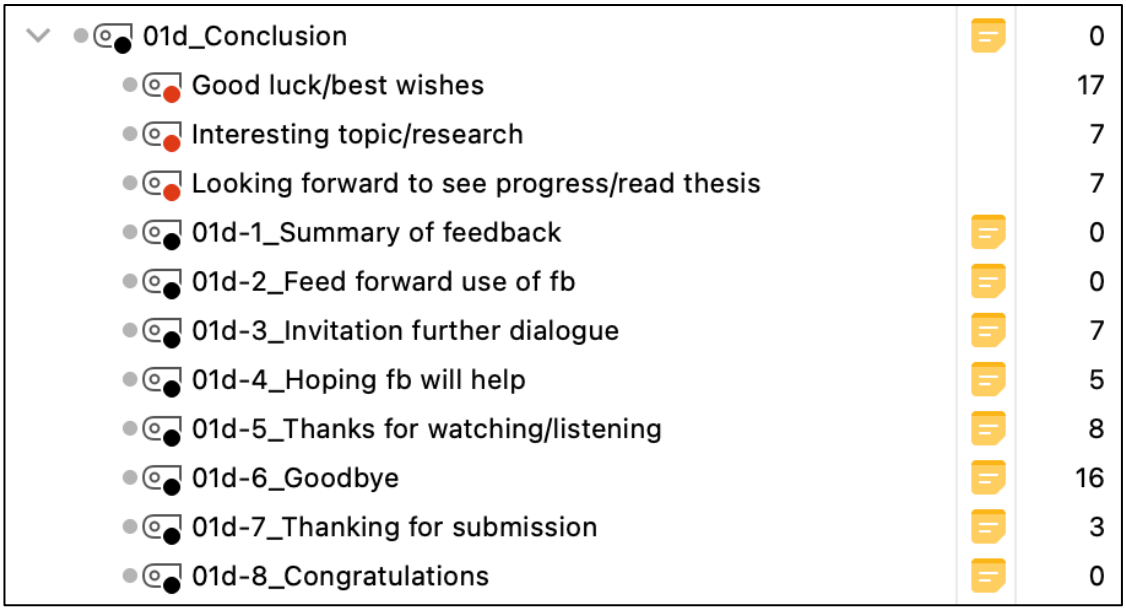


Figure 66: Overview of Codings in the Concluding Part of Recorded Feedback

The good wishes constituted a new category of the concluding part, as compared to the foregoing SCFB project (Schluer, 2021b; 2022b). Another newly added category was "looking forward to seeing progress/reading thesis" (N=7). Clearly, these two new categories result from the process approach that was adopted. The third new category resembled a code from the previous parts, namely that the topic was considered interesting (N=7).

Categories that were reused from the preceding SCFB project (Schluer, 2021b; 2022b) were

- goodbye (N=16)
- thanks for watching/ listening (N=8)
- the invitation to further dialogue (N=7)
- hoping that the feedback will help (N=5)
- thanks for submission (N=3)

Interestingly, however, the feedback was **not summarized** as it usually was in the previous SCFB study (Schluer, 2021b; 2022b). This probably resulted from the shorter nature of most clips in the current seminar. A similar tendency was observed for leaving out an evaluative summary to preview the feedback message (see section 4.8.5.2).

Some feedback conclusions contained several strategies, others just a few. Two examples (Figure 67 and Figure 68) serve illustrative purposes:

(04:01)
And erm lastly .. I.. wanted to thank you again that [sic] giving me this opportunity, I really liked. And erm yeah, ((giggles)) .. I wanted to say that [sic] good luck in your thesis and the research and erm let me know if I can help you or if you want, .. I can share with you my sources and my project as well and erm ..

(04:30)
Yeah. Thank you so much and .. erm Happy New Year ((laughs)).

Figure 67: Audiocast Conclusion Provided to S008 by S011 (04:01min)

In Figure 67, S011 thanked S008 for the opportunity of giving feedback (yellow), wished her good luck (red), offered further help (green), thanked for listening (pink) and included a farewell (wishing a Happy New Year) (white).

(04:42)
Anyway, I- I know that you are erm as excited about this ((laughs)) topic and even more excited than I am, and I cannot wait to see what you end up achieving.

(04:50)
And if you need any help, I would gladly try my best to offer any contribution. See you soon. Bye.

Figure 68: Audiocast Conclusion Provided to S012 by S005 (04:42min)

In the conclusion shown in Figure 68, S005 stressed his excitement to see S012's progress on her thesis (red), offered help (green) and said goodbye (white). The interest in the further progress and the offering of additional help resonate with the idea of feedback as an ongoing dialogue.

4.8.6. Positive and Negative Feedback

By analogy to the digital board categories (section 4.7.9), a distinction was made between positive and negative feedback as well as unclear cases.

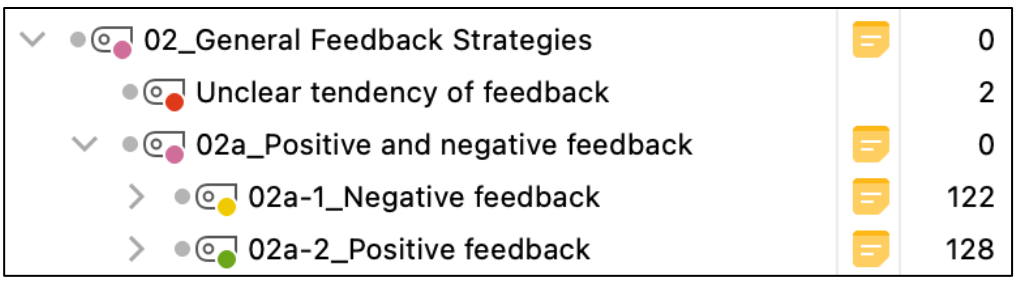


Figure 69: Overview of Codings for Positive and Negative Feedback in Audio- and Screencasts

As Figure 69 reveals, negative (N=122 instances) and positive feedback (N=128) were provided almost equally often. However, the subcategories in Figure 70 show that some positive feedback was non-specific (29 times) whereas no non-specific negative feedback was given.

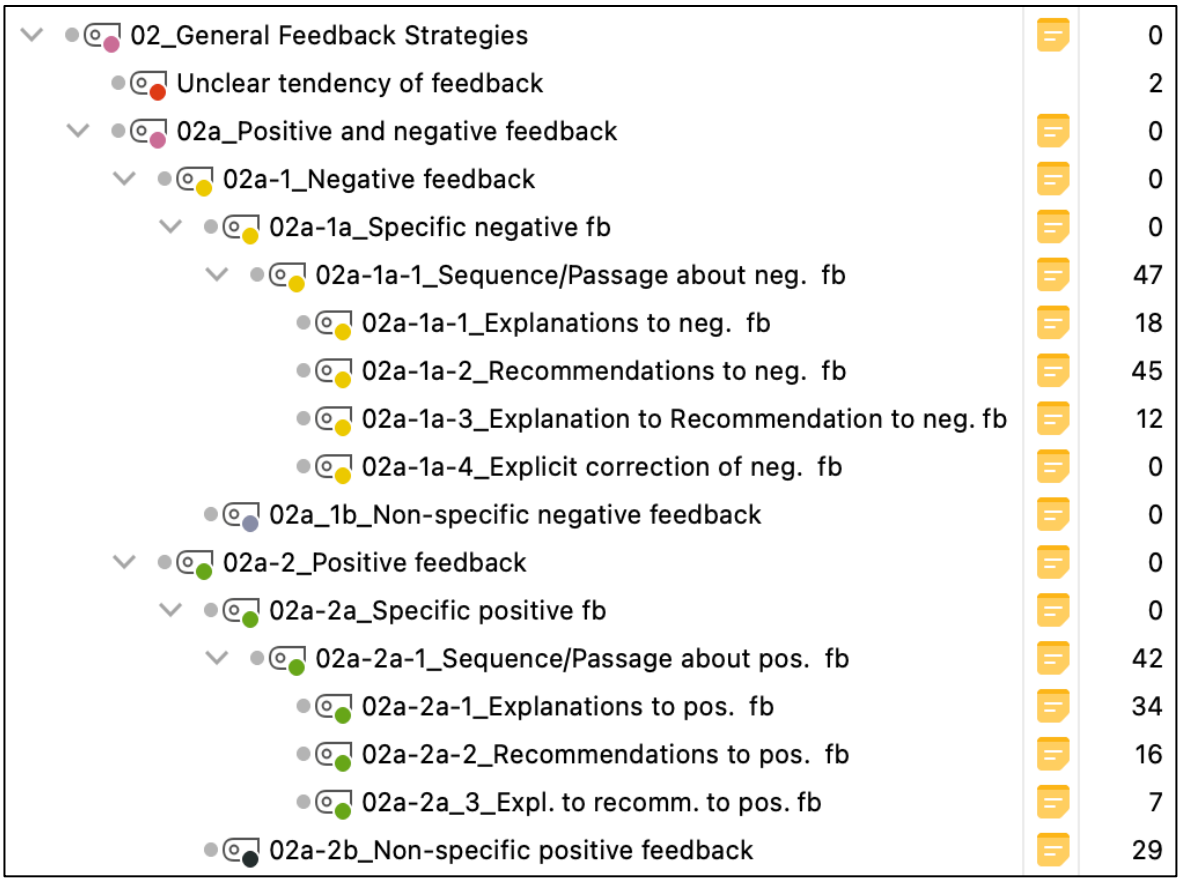


Figure 70: Subcategories of Positive and Negative Feedback in Audio- and Screencasts

There were N=2 sequences of unclear tendency, i.e. the direction of feedback was hard to determine. The sentence shown in yellow in Figure 71 was marked as unclear tendency because it could mean, on the one hand, that the feedback provider, S012, was unable to understand S001's plan as it was not written clearly enough or, on the other hand, that S012 did not read it well enough. Subsequently, she provided her understanding for reassurance (feedback purpose, colored in pink).

Hi S001. This is a very interesting topic. I had to read through your Padlet again to get an idea (about) [sic] what exactly you were planning to do. So I understand that you want to teach a course that is aimed at intercultural communicative competence that students erm that they're that it is fostered. So.. this is very interesting because especially at TU Chemnitz I have met lots of Chinese students and your culture is very fascinating and interesting to me.

Figure 71: Audiocast Sequence with Unclear Tendency Provided to S001 by S012 (00:00min)

Furthermore, in Figure 72, S001 stated that she found S005's plan very difficult. This might be interpreted as negative feedback because it could imply that S005 should think this through

again, or it could be positive feedback that acknowledges her efforts in dealing with a difficult topic.

(03:10)
Erm yeah, and then I found it is very difficult though you need to combine all those things together. Erm yeah, I hope, I wish you good luck. I am just randomly talking several [sic] things that I'm curious about and I just put myself into your shoes and just [sic] wondering what I would do erm if I were you. So I hope you will erm move forward erm as much as you want it.

Figure 72: Audiocast Sequence with Unclear Tendency Provided to S005 by S001 (03:10min)

These two passages with unclear tendencies were detected in audiocasts, where the oral tone did not help to clarify the intention. The remaining feedback passages were distributed across the audio- and screencasts as follows (Figure 73 and Table 49):

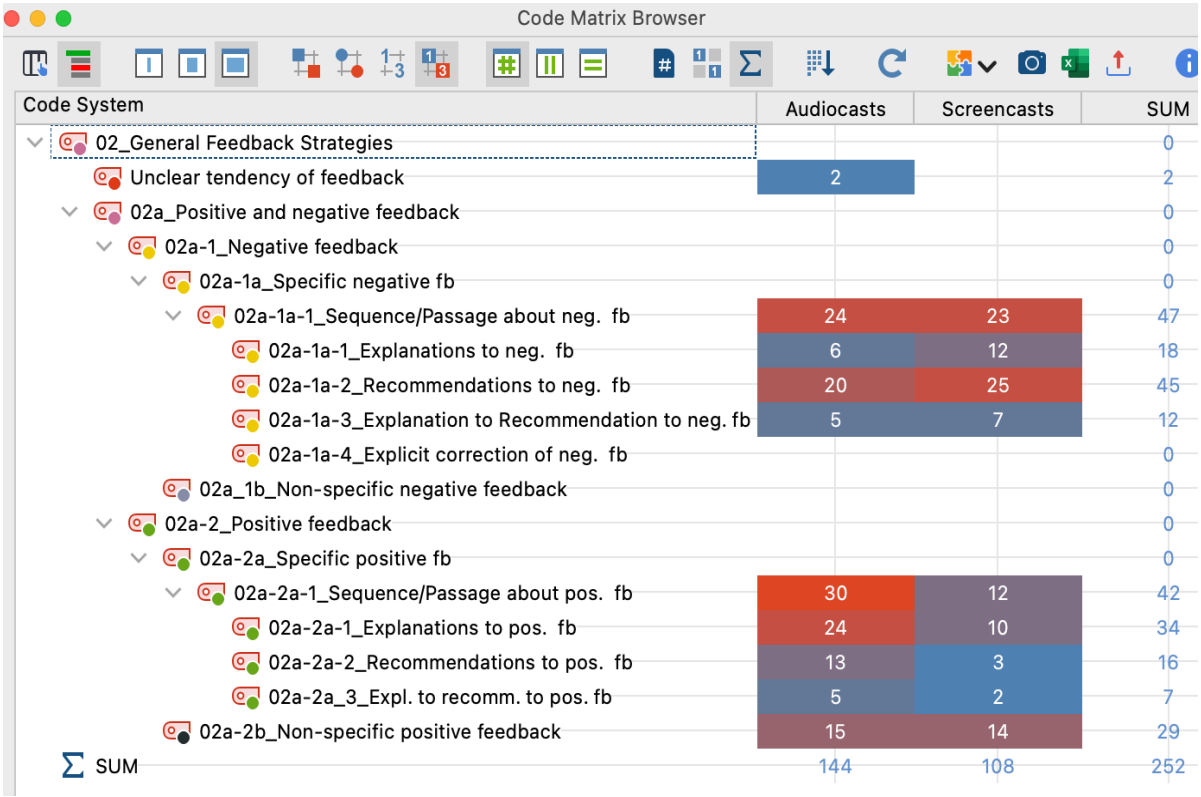


Figure 73: Code Matrix Browser of Positive and Feedback in Audiocasts and Screencasts

Table 49: Overview of Positive and Negative Feedback Strategies per Audiocast and Screencast in Total and on Average

General feedback strategies	Audiocasts		Screencasts		Total	
	Total	Average	Total	Average	Total	Average
Unclear tendency	2	0.13	0	0	2	0.07
Specific negative feedback						
- Sequence about neg. fb	24	1.50	23	2.09	47	1.74

General feedback strategies	Audiocasts		Screencasts		Total	
	Total	Average	Total	Average	Total	Average
- Explanations	6	0.38	12	1.09	18	0.67
- Recommendations	20	1.25	25	2.73	45	1.67
- Explanations to recommendations	5	0.31	7	0.64	12	0.44
Specific positive feedback						
- Sequence about pos. fb	30	1.90	12	1.09	42	1.56
- Explanations	24	1.50	10	0.91	34	1.26
- Recommendations	13	0.81	3	0.27	16	0.59
- Explanations to recommendations	5	0.31	2	0.18	7	0.26
Non-specific pos. feedback	15	0.94	14	1.27	29	1.07

We observe that all categories with the highest mean values of specific negative feedback and non-specific positive feedback occurred in the screencasts, whereas all categories pertaining to specific positive feedback appeared more often in the audiocasts.

While audiocasts consist of one mode only, screencasts are multimodal – including voice, screen and potentially a talking-head video. The distinct oral and visual strategies will therefore be inspected in the next sections 4.8.7 and 4.8.8.

4.8.7. Verbal/ Auditory Strategies

Verbal/auditory strategies comprise the language used in the feedback as well as auditory strategies. The overview in Figure 74 shows that personal pronouns occurred the most (N=980 instances), followed by hedges/boosters (N=461), linguistic fillers (N=363), auditory emphasis (N=335), oral comment types (N=63), oral reference to text (N=47) and paralinguistic communication (N=27). No background music was added to the audio-/screencasts.

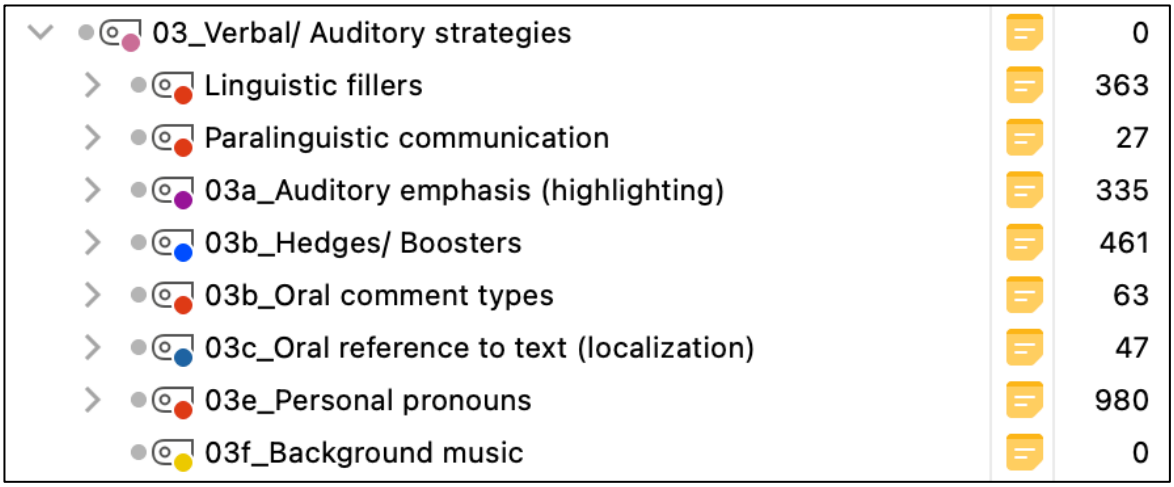


Figure 74: Overview of Auditory Categories in the Recorded Feedback

However, the screenshot also contains the codings of the author responses, which is why Table 50 was created for a more accurate overview.

Table 50: Total and Average Number of Verbal/Auditory Strategies per Feedback Method and in Total

Verbal/Auditory strategy	Audiocasts (16)		Screencasts (11)		Total (27)	
	Total	Average	Total	Average	Total	Average
Linguistic fillers	211	13.19	141	12.82	352	13.04
Paralinguistic communication	24	1.5	3.0	0.27	27	1.0
Auditory emphasis	192	12	143	13	335	12.41
Hedges/Boosters	283	17.69	178	16.18	461	17.07
Oral comment types	35	2.19	28	2.55	63	2.33
Oral reference to text	10	0.63	37	3.36	47	1.74
Personal pronouns	604	37.75	346	31.45	950	35.19

As shown in Table 50, linguistic fillers (M=13.19 occurrences per audiocast), paralinguistic communication (M=1.5), hedges/boosters (M=17.69) and personal pronouns (M=37.75) were used more in audio- than in screencasts on average. Conversely, auditory emphasis (M=13 occurrences per screencast), oral comment types (M=2.55) and oral reference to text (M=3.36) occurred more often in screen- than in audiocasts.

From the table, it appears that the discrepancies of the averages for oral reference to text and for paralinguistic communication were particularly large between audiocasts and screencasts. To find out if the codings for oral reference to text and paralinguistic features of the audiocasts and screencasts were significantly different, the t-test for two independent samples was applied. For oral reference to text, it yielded a p-value of 0.0036, which is smaller than 0.05. Hence, the means of audio- and screencasts were significantly different in the codings of oral reference to text, which were more common in screencast feedback. Likewise, for paralinguistic communication, a p-value of 0.0186 was calculated, which is smaller than 0.05 as well. Therefore, we have sufficient evidence to say that the means of audio- and screencasts were significantly different in the codings of paralinguistic features being more characteristic of audio feedback. These and further subcategories will be analyzed in a more fine-grained manner below.

4.8.7.1. Linguistic Fillers, Paralinguistic Communication, Auditory Emphasis

Two newly added categories of verbal/auditory strategies in this research were linguistic fillers and paralinguistic communication (marked in red in Figure 75).

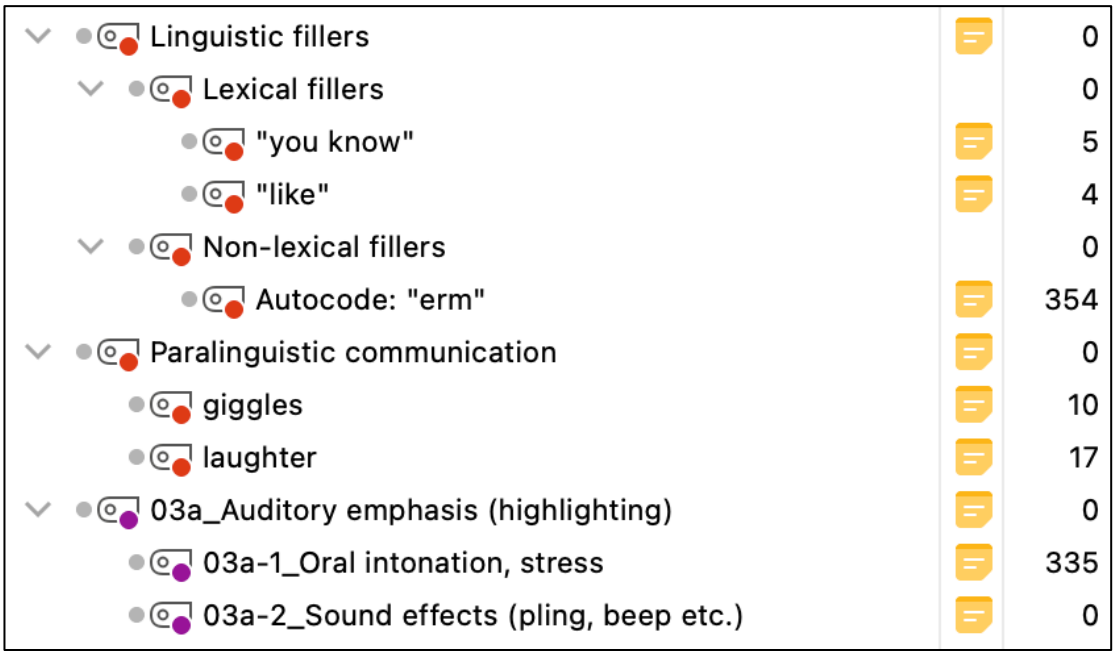


Figure 75: Codings of Linguistic Fillers, Paralinguistic Communication and Auditory Emphasis in Recorded Feedback

In comparison to the former study on screencast feedback (Schluer, 2021b; 2022b), non-lexical fillers like “erm” and paralinguistic cues like giggles and laughter appeared remarkably often. This could be an indication of the more spontaneous and conversational nature of the current recordings.

Auto-coded passages of “erm” were counted N=207 times in 16 audiocasts and N=136 times in 11 screencasts. On average, they appeared M=12.94 times in audiocasts and M=12.36 times in screencasts, i.e. almost equally often. The remaining N=11 occurrences of “erm” were found in the two responses by S003 (see section 4.8.10).

Moreover, giggles and laughter appeared in N=10 out of 27 files; in N=4 of them, both occurred. Most giggles and laughter were detected in the audiocasts (24 times in total), as Figure 76 elucidates.

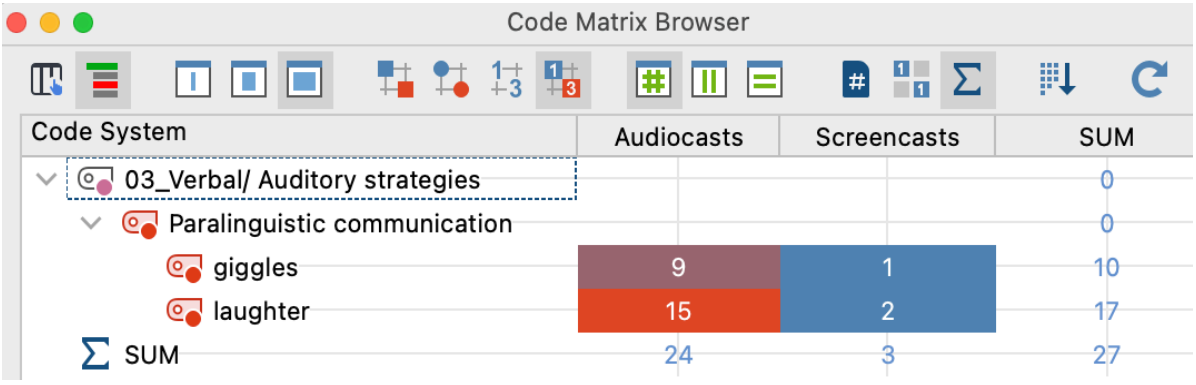


Figure 76: Code Matrix Browser of Paralinguistic Cues per Feedback Method

4.8.7.2. Hedges/ Boosters and Oral Comment Types

In this section, the codings of linguistic hedges and boosters as well as oral comment types will be presented. In line with related prior research (Schluer, 2021b; 2022b), statements were not coded as a comment type but considered as the default. Therefore, only imperatives and questions are shown as sentence types in Figure 77.

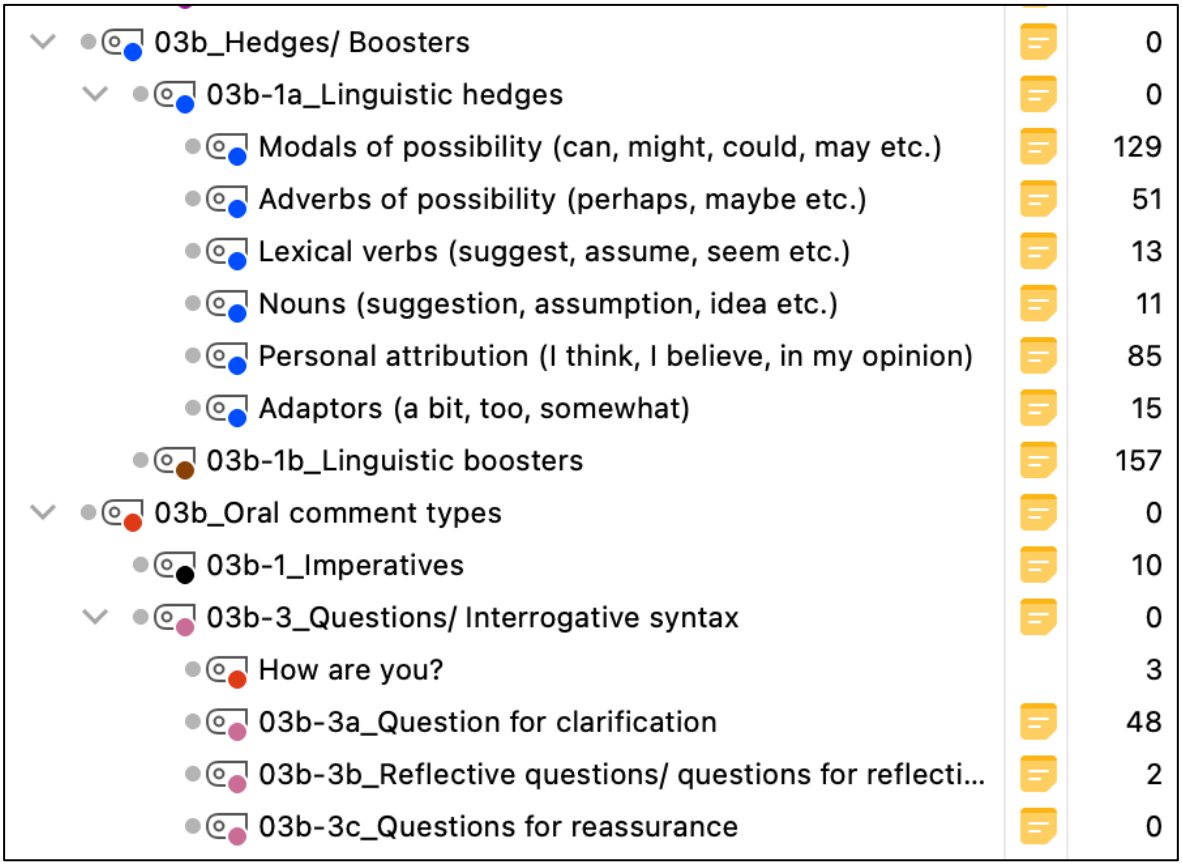


Figure 77: Codings of Hedges/ Boosters and Oral Comment Types in Recorded Feedback

To give a separate account of hedges and boosters as well as the oral comment types in the audiocasts and screencasts, the code matrix browser displayed in Figure 78 was created. Moreover, averages were calculated, which are shown next to the total codings in Table 51.

Except for the following three categories, all codes for hedges, boosters, and questions occurred more in the audiocasts than in the screencasts (in total and on average):

- adverbs (N=27 in total, M=2.45)
- imperatives (N=9 in total, M=0.82)
- How are you? (N=3 in total, M=0.27)

Linguistic hedges occurred M=11.56 times, boosters M=6.13 times and questions for clarification M=2.06 times on average per audiocast.

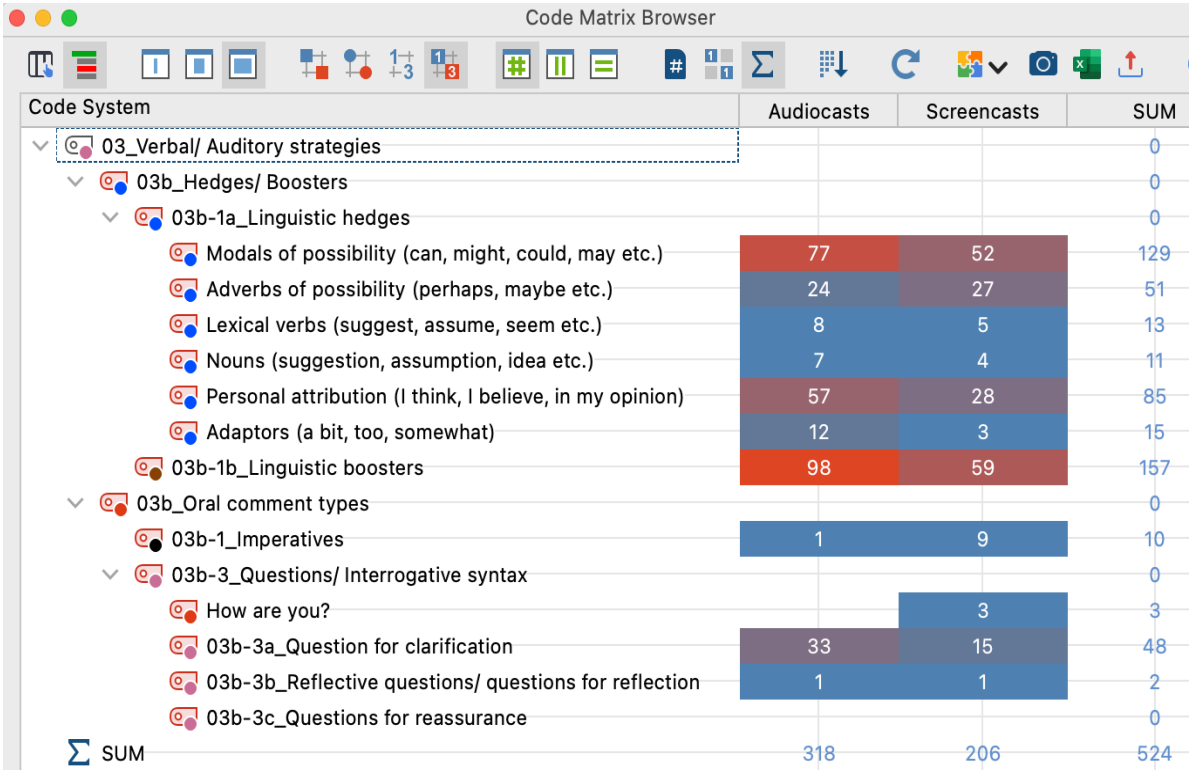


Figure 78: Code Matrix Browser for Hedges/Boosters and Oral Comment Types in Audio- and Screencasts

Table 51: Hedges/Boosters and Oral Comment Types in Audio- and Screencasts in Total and on Average

Verbal strategies	Audiocasts		Screencasts		Total	
	Total	Average	Total	Average	Total	Average
Linguistic Hedges	185	11.56	119	10.82	304	11.26
- Modals	77	4.81	52	4.73	129	4.78
- Adverbs	24	1.50	27	2.45	51	1.89
- Lexical verbs	8	0.50	5	0.45	13	0.48
- Nouns	7	0.44	4	0.36	11	0.41
- Personal attribution	57	3.56	28	2.55	85	3.15
- Adaptors	12	0.75	3	0.27	15	0.56
Linguistic Boosters	98	6.13	59	5.36	157	5.81
Imperatives	1	0.06	9	0.82	10	0.37
Questions						
- How are you?	0	0	3	0.27	3	0.11
- Questions for clarification	33	2.06	15	1.36	48	1.78
- Reflective questions	1	0.06	1	0.09	2	0.07

To find out whether the codings for linguistic hedges and boosters of the audiocasts and screencasts were significantly different, the t-test for two independent samples was applied. For linguistic hedges, it yielded a p-value of 0.4303, which is larger than 0.05. For boosters, a

p-value of 0.3881 was calculated, which is larger than 0.05, too. Therefore, we do not have sufficient evidence to confirm the null hypothesis. Consequently, the means of audio- and screencasts were similar in the codings of linguistic hedges and boosters. Here are some examples of linguistic hedges (blue) and boosters (pink):

(00:45)
Those films and TV shows are really erm ... I think it is kind of entertaining erm materials, but on the other hand side [sic], it's really helpful for foreigners to learn English. And of course erm probably some teachers have also erm integrated those materials in their teaching.

Figure 79: Audiocast Excerpt Provided to S005 by S001 (00:45min)

In Figure 79, “really” and “of course” were used as boosters, and “I think”, “kind of” and “probably” as hedges. Interestingly, the booster “of course” was changed to a hedged expression (“probably”) after a short break (non-lexical filler “erm”).

“Maybe” and “would” were further common expressions of possibility, as in Figure 80.

(01:38)
Just, you know .., think that through again. Erm maybe you'll come to the conclusion that you would like to include all of those. And I understand and I think you would be able to make this work somehow. Erm maybe it would be easier to just choose .. some of these aspects and really go into detail there.

Figure 80: Screencast Excerpt Provided to S011 by S014 (01:38min)

Additional variants of hedges and boosters are given in the audiocast excerpt in Figure 81.

(01:35)
It's obviously something that you based on the literature you have read and then you build your own conceptualization of motivation. However, the participants of the survey might have very different understandings ((laughs)) of motivations. For some, it might be, "oh cool, we watch a movie", so this is motivating ((laughs)). But yeah, they ((laughs)) might understand it a little bit different. So I was wondering if you are providing them with some kind of guideline on how to understand motivation?

(02:06)
Or how are you planning to do that? And then also I was wondering if you are giving them any examples of movies that could be included or how erm materials, tasks or exercises could look like if it [sic] would be integrated into erm language learning materials. So yeah, this is really something I would like to know. Other than that, I think it's really great that you have already planned out your schedule and your time. Because this is very great for time management and breaking up everything into parts and when you want to finish them.

Figure 81: Audiocast Excerpt Provided to S005 by S012 (01:35min)

Furthermore, a propensity for boosters is evident in the sample from a screencast in Figure 82.

(01:04)
((scrolls up and down)) And the first thing is how are you going to define humor? You know ((cursor moves unintentionally)) seeing in your- of course, there is your research questions [sic], but ((scrolls down)), also in the- in the sources that you have added here, I haven't really found that yet. Just a question from me personally, because humor is something so .. so personal and very individual, you know what people define as humor and think you- is humorous or not. That I think that is a very challenging but also very interesting point in your thesis.

Figure 82: Screencast Excerpt Provided to S008 by S014 (01:04min)

4.8.7.3. Personal Pronouns

Personal pronouns were auto-coded in MAXQDA, which led to the overview shown in Figure 83.

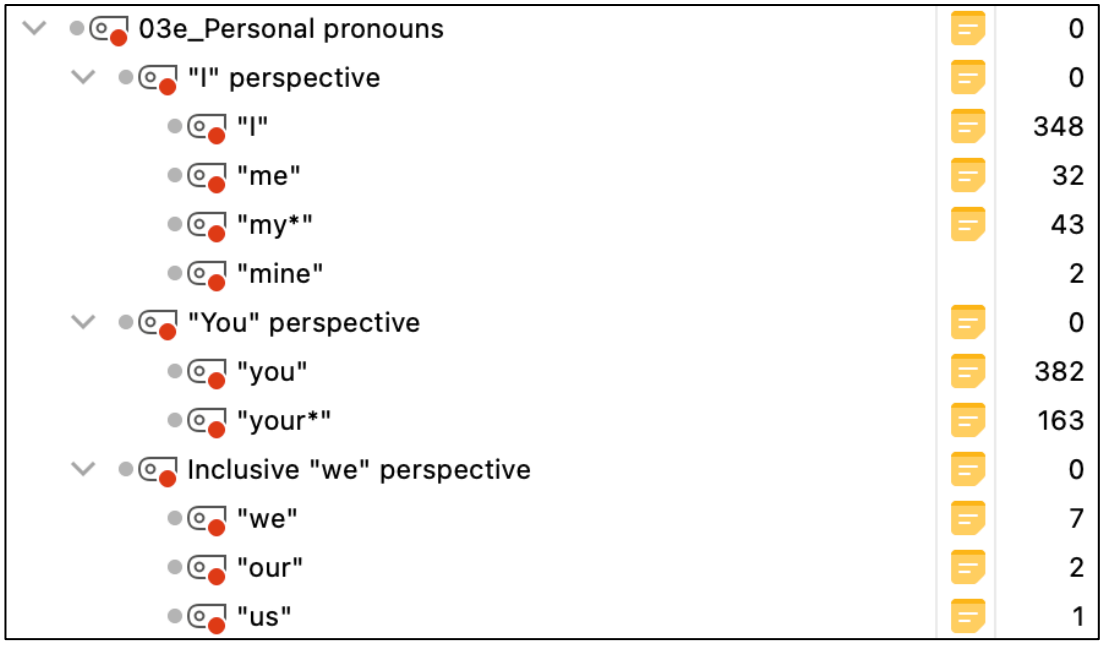


Figure 83: Overview of Codings of Personal Pronouns in Recorded Feedback

By summing up the detailed counts, we obtain N=545 codings instantiating the "you" view, N=425 codings pertaining to the "I" perspective, and N=10 codings representing the collective "we" stance. A breakdown of the codings according to the two different datasets (audiocasts and screencasts) is offered in Table 52 and Figure 84, respectively.

Table 52: Overview of Personal Pronouns per Audiocast and Screencast in Total and on Average

Personal Pronouns	Audiocasts		Screencasts		Total	
	Total	Average	Total	Average	Total	Average
"I" perspective	275	18.19	134	12.18	425	15.74
"I"	234	14.63	101	9.18	348	12.89
"me"	16	1.00	16	1.45	32	1.19
"my"	23	1.44	17	1.55	43	1.59
"mine"	2	0.13	0	0	2	0.07
"You" perspective	322	20.13	209	19.00	545	20.19
"you"	232	14.50	141	12.82	382	14.15
"your*"	90	5.625	68	6.18	163	6.04
"We" perspective	7	0.438	3	0.27	10	0.37
"we"	5	0.313	2	0.18	7	0.26
"our"	2	0.13	0	0	2	0.07
"us"	0	0	1	0.09	1	0.04
All pronouns (total)	1,208	75.5	692	62.91	980	36.30

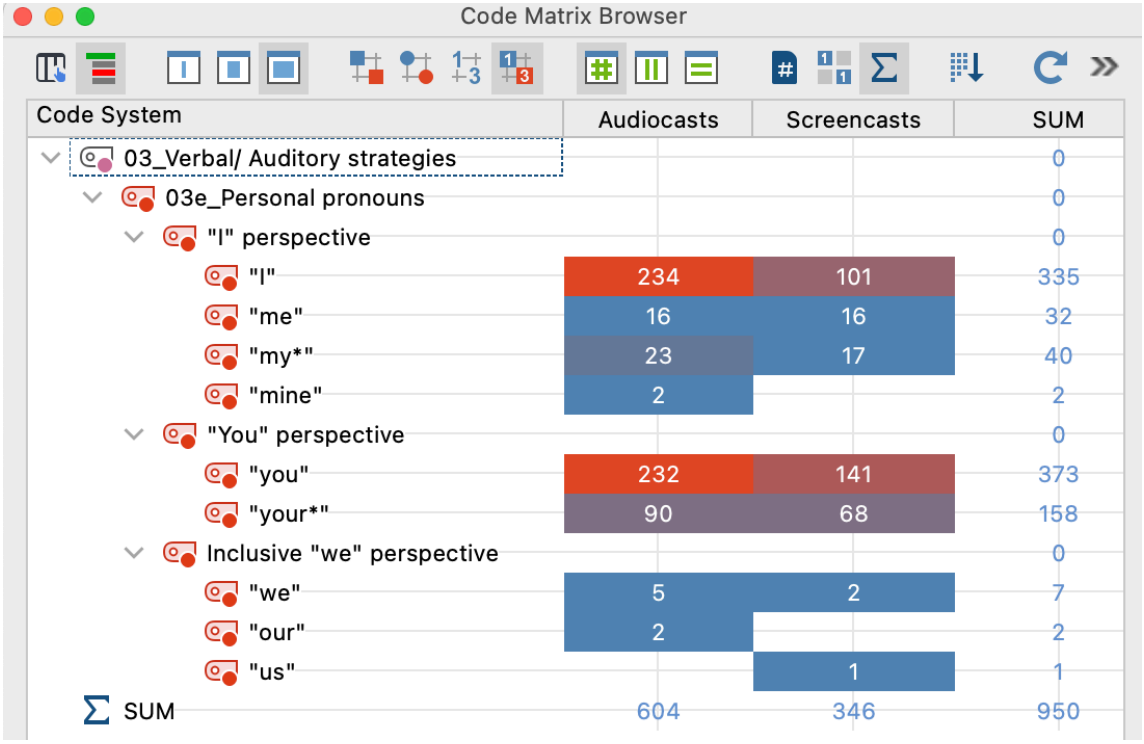


Figure 84: Code Matrix Browser of Personal Pronouns in Audio- and Screencasts

Overall, audiocasts included more pronouns in total and on average (N=1,208; M=75.5) than screencasts (N=692; M=62.9). With p=0.01 (i.e. p<0.05), this difference is statistically significant (t-test for independent samples). Looking at specific pronouns, we see that only “my”, “me” and “your*” were used more often on average in the screencasts. By contrast, the pronoun “I” was particularly prominent in the audiocasts, with a mean of M=14.63 as opposed to M=9.18 in the screencasts. This difference was statistically significant (p<0.05), almost highly significant with p=0.0013. Furthermore, on average, most “we”-related pronouns occurred in the audiocasts, whereas “us” was used only once in total (in a screencast). Again, we note a highly significant difference here, but due to the generally rare occurrence of “we” pronouns, such a finding is disputable and needs further confirmation by a larger data corpus.

4.8.7.4. Oral Reference to Text

“Oral reference to text” is oral signposting in which the feedback provider mentions a specific passage or part in the work they are commenting on. Most localization strategies from the foregoing screencast feedback study did not recur in the current research project, as the zero codings in Figure 85 elucidate.

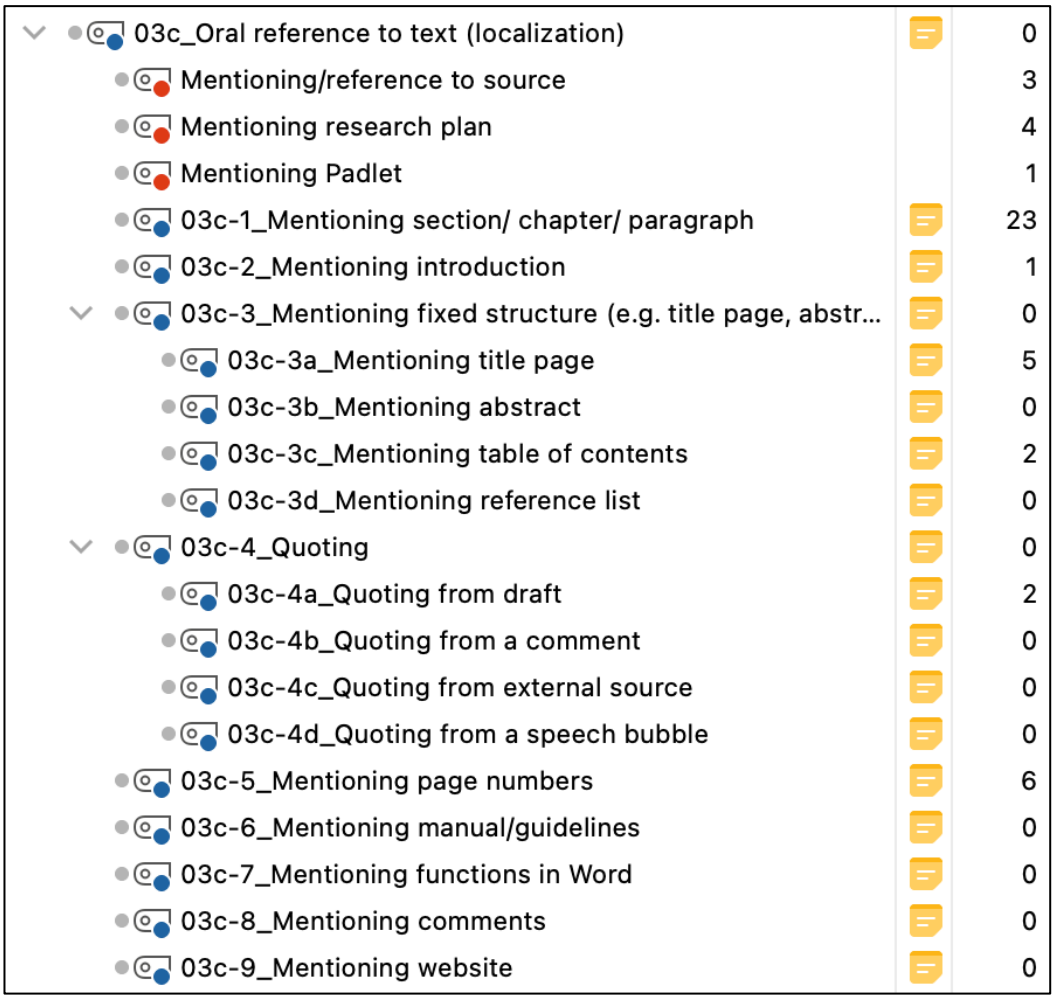


Figure 85: Overview of Codings of Oral References in Recorded Feedback

However, the unnumbered red dots in the upper part of Figure 85 index the three new subcategories, which are references to a previous task (Padlet; N=1), reference to a source (N=3), and reference to the first part of the current assignment, i.e. the research plan (N=4).

As Figure 86 shows, oral referencing was used most in screencasting (N=37 times in total, M=3.36 times per screencast; audiocasts: N=10 times in total, M=0.63 times on average).

Most commonly, i.e. in 23 cases, the feedback providers mentioned a specific section/chapter/paragraph of the work plan or table of contents. This mostly occurred in the screencasts (19 times) rather than in audiocasts (4 times). Therefore, it is worthwhile to examine their interrelationships with visual strategies (see section 4.8.8), e.g. through the Code Relations Browser in Figure 87. It shows that oral referencing was frequently supported by cursor movements. In 18 cases, the feedback provider was scrolling through the document. In 9 cases, they were pointing or circling with cursor. In 7 instances, the cursor moved unintentionally/to blank space, while in 5 cases, the feedback provider was drawing an object around the relevant passage.

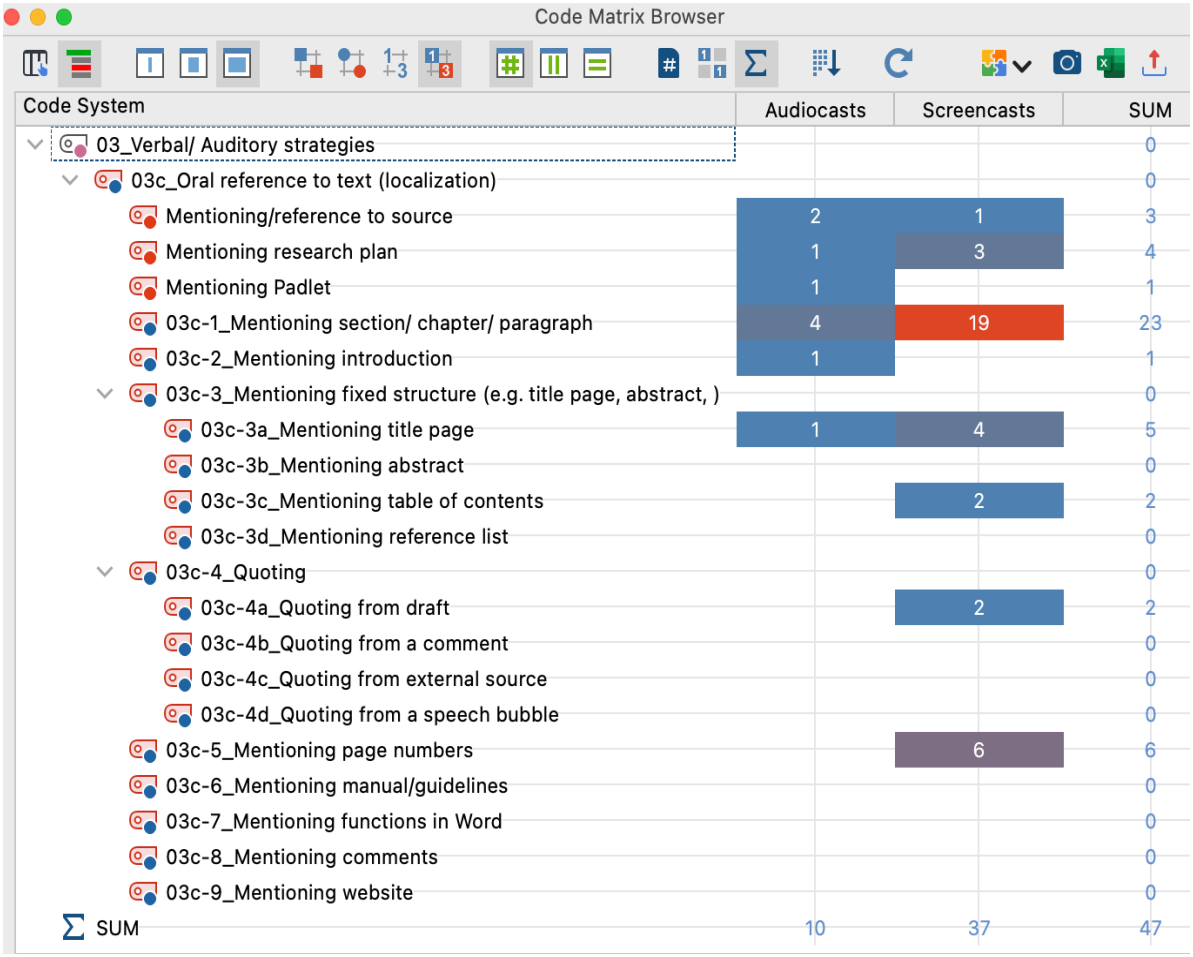


Figure 86: Code Matrix Browser of Oral References in Audiocasts and Screencasts

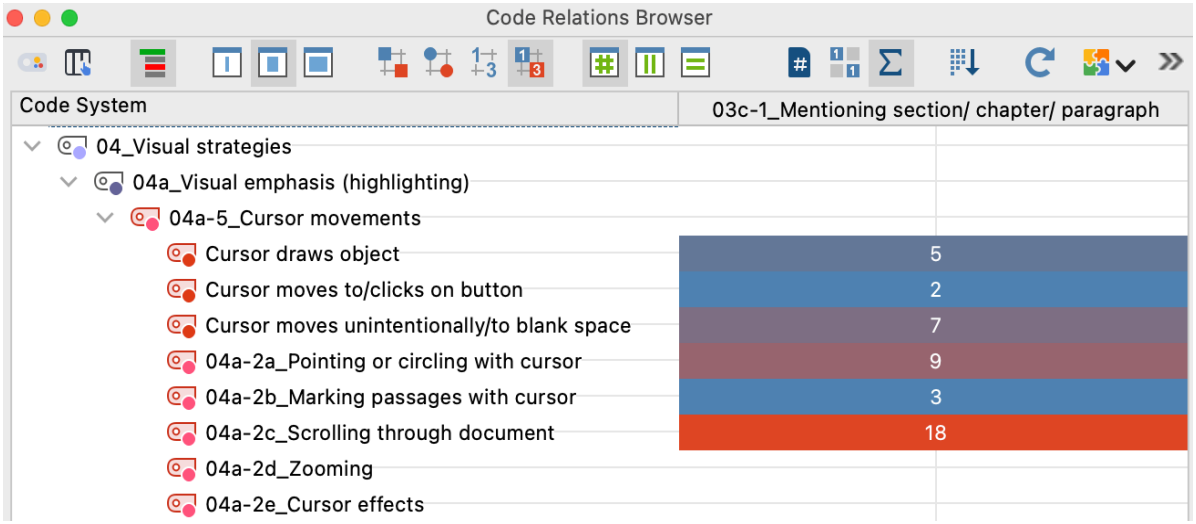


Figure 87: Code Relations Browser of Visual Strategies and Most Common Oral Referencing Strategy (Mentioning Section/Chapter/Paragraph)

For example, the intentional use of the cursor is exemplified by the screencast feedback sequence transcribed below:

> "And I have just ((scrolls down)) .. wondering [sic] … here ((scrolls upward)), under **((cursor points to the word "research gap" and the sentence "There is a need to survey about the effects …"))** research gap here, you say there is a need to survey about the effects, but you don't refer to ((moves cursor unintentionally)) any current researches [sic] why there is a- there is a need." (Screencast to S003 by S004, 00:15min)

Further cursor movements are evident in another screencast shown here:

> "In the same- ((rectangles disappear)) ((scrolls down)) in a similar question, the second point that I had is I saw **((cursor points to the phrase "6-8 weeks"))** that there- you've planned in four weeks approximately for the empirical research. .. And I'm afraid that might not be enough. .. Looking at **((cursor moves upward and points to the phrase "empirical research"))** all the things that you want to do during your empirical research phase – you want to prepare the research, you want to conduct a pilot study, a main study, and the transcription and the analysis, and especially transcription usually takes very long and often longer than expected. So maybe just go through that again." (Screencast to S008 by S014, 02:54min)

Details about the visual strategies in the recorded screencast feedback will be dealt with next.

4.8.8. Visual Strategies

Generally, visual strategies can be utilized in screencasts, but not in audiocasts. Thus, the current analysis only focuses on the 11 screencasts that were produced by the students. In contrast to an earlier screencast feedback project (Schluer, 2021b; 2022b), the use of visual strategies was rare in the present research. Overall, just one category was applied, which is visual emphasis, as can be seen in Figure 88.

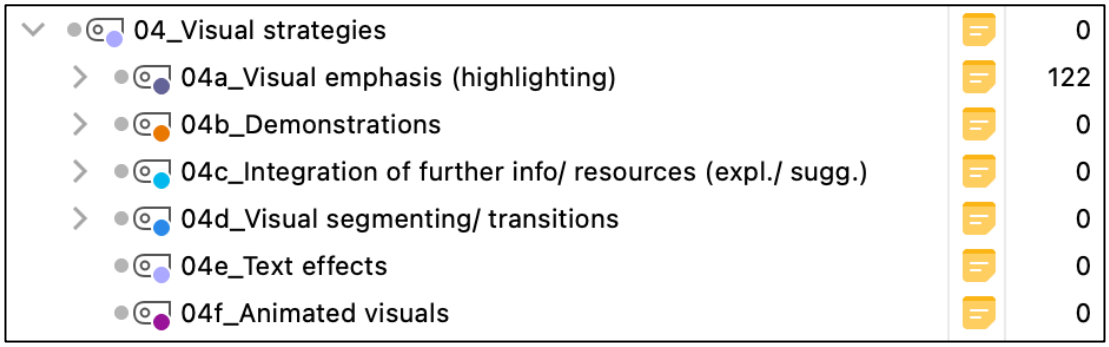


Figure 88: Overview of Visual Strategies in Screencast Feedback

The visual emphasis category unfolded into several highlighting techniques, as the analysis in the previous SCFB study has demonstrated (Schluer, 2021b; 2022b). However, in the current research, only cursor movements were utilized by the participants for visual emphasis (see Figure 89).

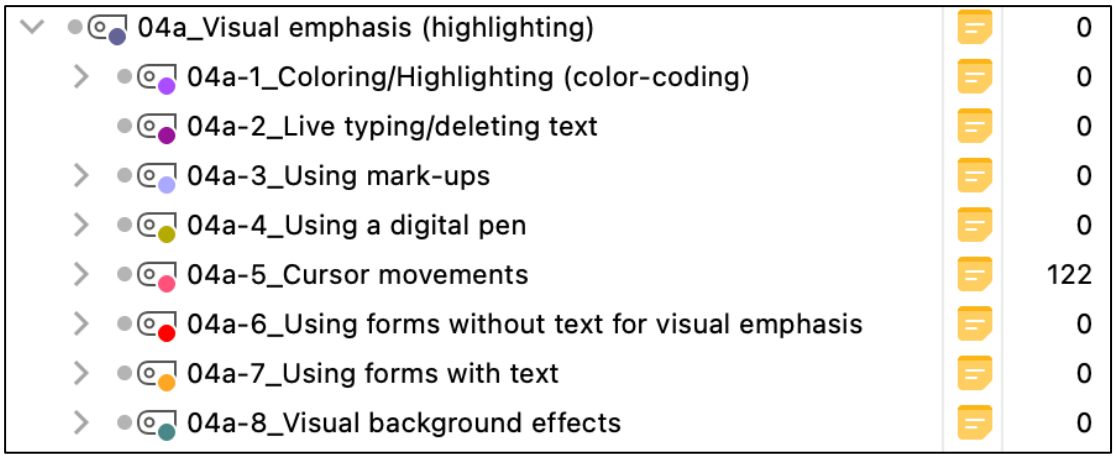


Figure 89: Subcategories for Visual Emphasis in Screencast Feedback

Cursor movements, in turn, can be of various kinds, as Figure 90 elucidates.

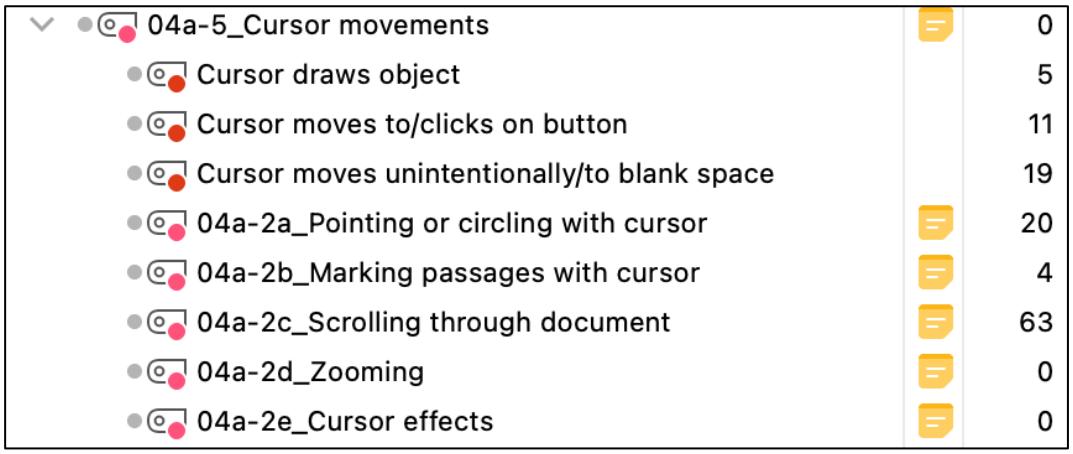


Figure 90: Subcategories for Cursor Movements in Screencast Feedback

Cursor movements thus were the only visual strategy that students had utilized in the present study. However, they comprised several techniques, some of which had not been employed in the foregoing SCFB study by Schluer (2021b; 2022b). This partly resulted from the different software programs used by the students in both groups. While students in the earlier screencast feedback project commonly resorted to Camtasia as the recording and editing software, the participants in the present study either used specific apps on their smartphones or freeware programs on their laptop (such as Screencastify or Loom). For instance, the live drawing of objects (such as boxes) or the clicking on buttons in the navigation bar were features available in the Screencastify web version. Hence, they emerged as additional strategies for visual emphasis, as indicated by the red dots in Figure 90.

Within this category, prevalent visual particularities were scrolling through document (N=63 instances), pointing or circling with cursor (N=20), cursor moving unintentionally/to blank space (N=19), cursor moving to/clicking on button (N=11), cursor drawing object (N=5), and marking passages with cursor (N=4). Indeed, scrolling through the document was used in

every screencast, whereas the amount and variation of the other strategies differed (see Table 53).

Table 53: Cursor Movements in the Screencasts

Category	S002_S004_WP	S002_S004_TOC	S003_S002_WP	S003_S002_TOC	S003_S004_WP	S003_S004_TOC	S004_S002	S007_S006	S008_S014	S011_S014	S013_S006	SUM
Cursor draws object									5			**5**
Cursor moves to/ clicks on button		1		2		1			6	1		**11**
Cursor moves unintentionally/ to blank space		1			5	2			11			**19**
Pointing or circling with cursor	7	4			2	1			6			**20**
Marking passages with cursor					4							**4**
Scrolling through document	8	2	8	5	3	6	7	3	10	8	3	**63**
SUM	**15**	**8**	**8**	**7**	**14**	**10**	**7**	**3**	**38**	**9**	**3**	**122**

As can be seen in Table 53, S014's screencast for S008 included the highest number (N=38) and also the greatest variety of techniques, with five out of six different cursor movements being used. With only 15 instances, the screencast with the second most used cursor movements contained less than half of it (S004's screencast on S002's work plan). Here, the student applied two techniques: scrolling through document and pointing or circling with cursor. However, it should be noted that S014's screencast for S008 was 05:40min long (with 52.76 codings per minute), making it an extreme case, and S004's screencast for S002 was 03:05min long (with 50.95 codings per minute), which was not an extreme case (see section 4.8.1). Conversely, the shortest screencast by S006 for S007 comprised only 00:31min, but contained 60.00 codings per minute. Finally, S006's screencast for S013 showed the lowest amount of cursor movements, with scrolling through document appearing N=3 times in total.

S014's screencast to S008, in which most cursor strategies were used, was also the only one that employed a live drawing of boxes around key words. In the first instance (Figure 91), S014 marked the words "quantitative" and "interview(s)" in S008's work plan to pinpoint a potential contradiction since interviews are typically qualitative in nature.

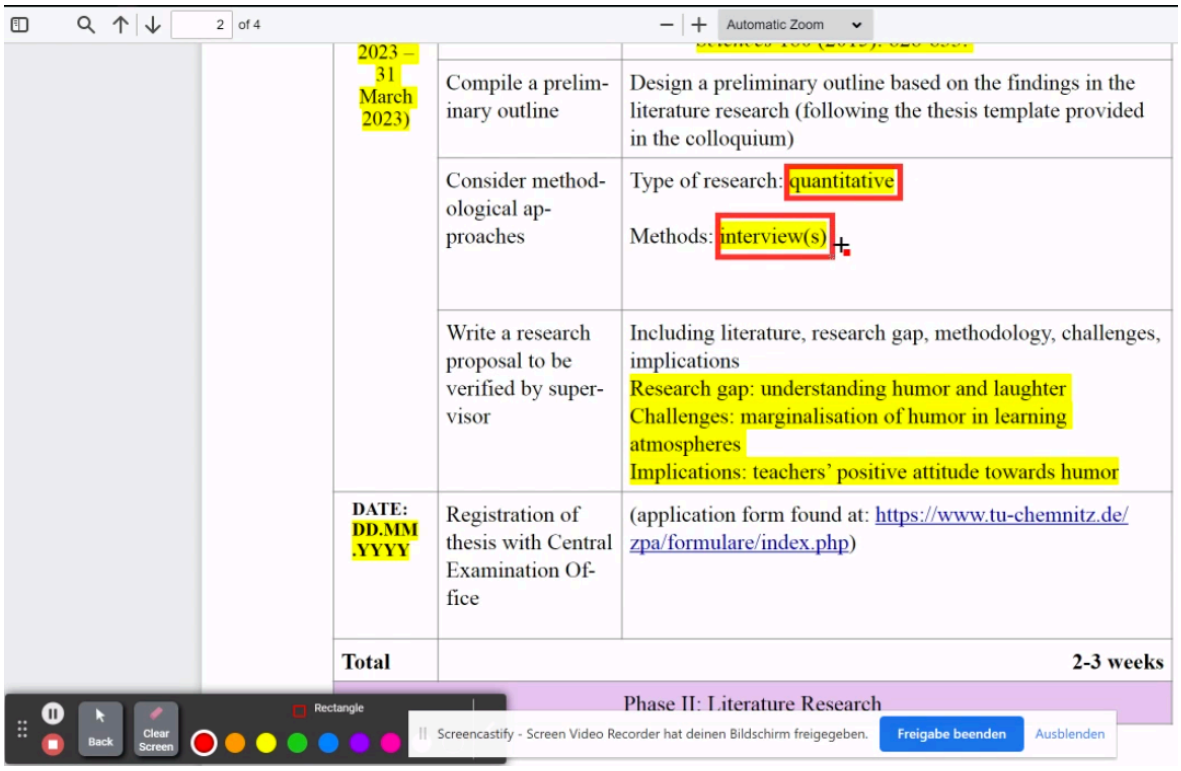


Figure 91: Screenshot of Visual Emphasis in S014's Screencast to S008 (02:19min)

In another instance (04:54min in the same screencast), we observe that S014 utilized two different colors, one for British English (orange) and the other one for American English (red). Her intention was to highlight S008's inconsistencies in using the two spelling variants throughout the paper, notably by referring to the words "humor" vs. "humour" and "marginalization" vs. "marginalisation". Overall, this screencast was the only one that contained boxing as a visual strategy. Likewise, there was only one video in which the category "marking passages with cursor" occurred (S004's screencast on S003's work plan shown in Figure 92).

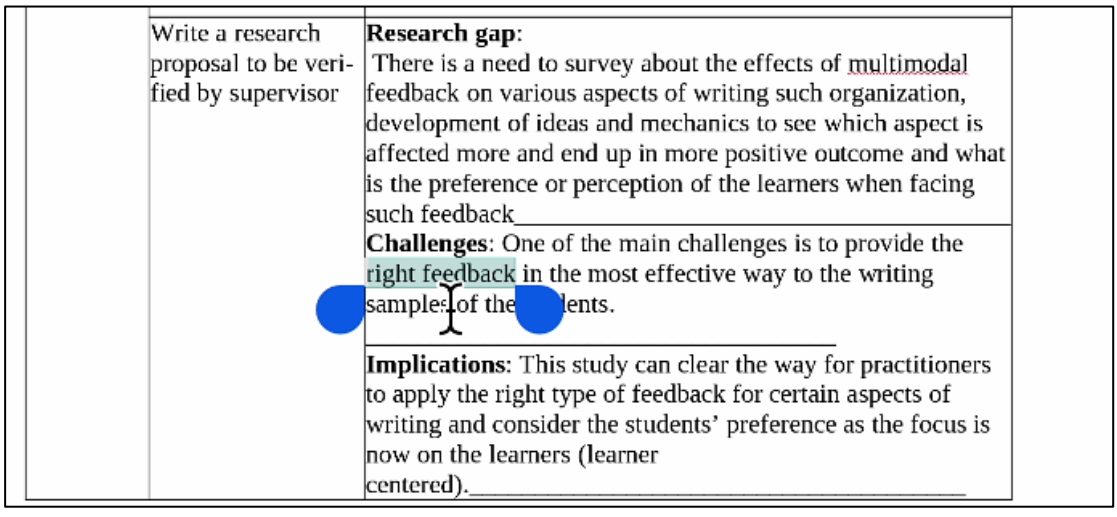


Figure 92: Screenshot of Marking Passages with Cursor in S004's Screencast on S003's Work Plan (01:10min)

Here, S004 inquired into what exactly S003 meant by “right feedback” and therefore highlighted it while she was talking about this uncertainty. Overall, it is surprising to see that only one person deployed this strategy, even though passages can be easily marked with a cursor, which does not depend on the installation of a specific screenrecording software.

4.8.9. Critical Evaluation of Recorded Feedback (Exemplary)

The critical evaluation was a crucial part of the preceding screencast feedback project by Schluer (2021b; 2022b), as the elaborate category system in Figure 93 reveals.

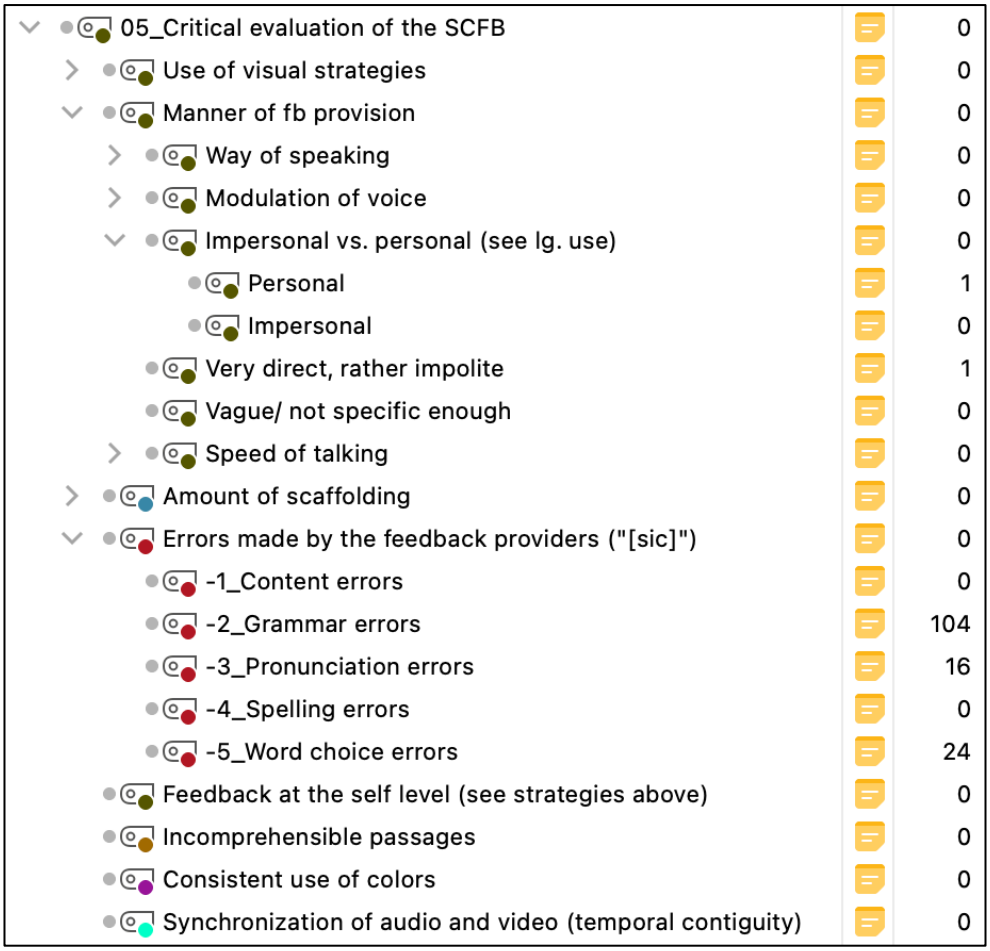


Figure 93: Overview of Categories for the Critical Evaluation of Recorded Feedback

In the present research, noteworthy aspects or comments were coded and assessed only selectively. In that regard, two examples for **personal** and **very direct** language will be presented. First, in her feedback to S005, S001 admitted in a personal statement that she found S005’s topic very difficult. Also, this statement was coded as “unclear tendency” (Figure 94; see also section 4.8.6).

(03:10)
Erm yeah, and then I found it is very difficult though- you need to combine all those things together. Erm yeah, I hope, I wish you good luck. I am just randomly talking several [sic] things that I'm curious about and I just put myself into your shoes and just [sic] wondering what I would do erm if I were you. So I hope you will erm move forward erm as much as you want it.

Figure 94: Audiocast Excerpt Provided to S005 by S001 (03:10min)

In another statement depicted in Figure 95, S008 criticized S014's research methodology as being "unclear". She used neither linguistic hedges nor boosters, which made this statement sound very direct and potentially impolite.

(00:51)
However, this research methodo- methodology is unclear to me as your proposal or compile [sic] of thoughts does not provide a clear research methodology. How are you (going?) to approach an analysis data [sic] in your research and how many content creators are you willing to contact? Is there .. a certain way to do that, as contact [sic] creators tend to not answer everybody's question [sic] or comments.

Figure 95: Audiocast Excerpt Provided to S014 by S008 (00:51min)

The examples also show a relative density of linguistic lapses, which will be inspected next. In the transcripts, all errors and mistakes were colored in red and marked with the word "[sic]". Accordingly, it was possible to auto-code these occurrences and to manually identify the type of error afterwards. As shown in Figure 96, most errors were grammatical errors (N=100 in total), followed by word choice errors (N=21) and pronunciation errors (N=14).

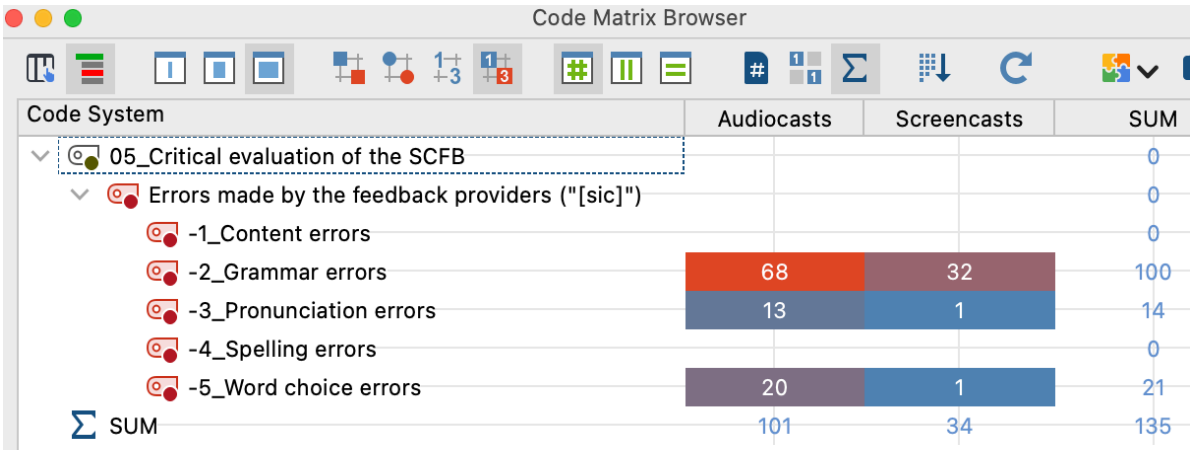


Figure 96: Code Matrix Browser of Errors in Audiocasts and Screencasts

In contrast to the preceding SCFB study (Schluer, 2021b; 2022b), no content and spelling errors were detected in the feedback. In fact, spelling errors can only occur if the feedback providers add text during the screenrecording, which nobody did, however. Since the current research not only comprised screencasts, a more detailed breakdown of the error types in audio- vs. screencasts is shown in Table 54.

Table 54: Overview of Errors in Audiocasts and Screencasts in Total and on Average

Errors	Audiocasts		Screencasts	
	Total	Average	Total	Average
Content errors	0	0	0	0
Grammatical errors	68	4.25	32	2.91
Pronunciation errors	13	0.81	1	0.09
Spelling errors	0	0	0	0
Word choice errors	20	1.25	1	0.09

In total as well as on average, the audiocasts contained more errors. Per audiocast, there were M=4.25 grammatical errors, M=1.25 word choice errors and M=0.81 pronunciation errors. To find out whether the occurrences of grammatical errors of the audiocasts and screencasts were significantly different, the t-test for two independent samples was applied. It yielded a p-value of 0.0671, which is larger than 0.05. Hence, the differences in grammatical errors between audiocasts and screencasts were not significantly different.

To examine whether the codings for pronunciation errors in the audiocasts and screencasts differed significantly, the t-test for two independent samples was applied. It yielded a p-value of 0.0445. Since this is smaller than 0.05, the number of pronunciation errors in audio- and screencasts was significantly different, with more of them occurring in the audiocasts. Furthermore, to check whether the codings for word choice errors in the audiocasts and screencasts were significantly different, another t-test for two independent samples was performed. For word choice, it yielded a p-value of 0.0093. This is smaller than 0.05, so we again have sufficient evidence to affirm that the means of audio- and screencasts were significantly different, with more word choice errors committed in the audiocasts.

4.8.10. Author's Response to Recorded Feedback

Another action that was not observed in the foregoing SCFB study by Schluer (2021b; 2022b) was the voluntary production of a recorded feedback response. However, overall, there was only one person (S003) who created recordings as a feedback follow-up. More precisely, in response to the feedback provided by her peers (S002 and S004), S003 produced two audiocasts. The analysis of her audio replies resulted in the codings shown in Figure 97.

Response to feedback	0
Feedback method	0
Audio feedback	2
Greeting by using name	2
Thanking	0
Thanking for listening	2
Thanking for feedback	1
Explaining	2
Taking advice	2
Technical problems	2
Goodbye	2

Figure 97: Overview of Codings for Response to Recorded Feedback

The two recorded responses will be examined in more detail below. The first case is S003's response to the feedback received from S004. As depicted in Figure 98, she first greeted S004 by using her name, and hoped that she was doing fine. Then, she mentioned some trouble understanding her voice in the audiocast, before giving an explanation to the feedback she received about her unspecific TOC, saying that she would complete it in the future (taking advice). After mentioning some technical problems again, she thanked S004 for listening and said goodbye.

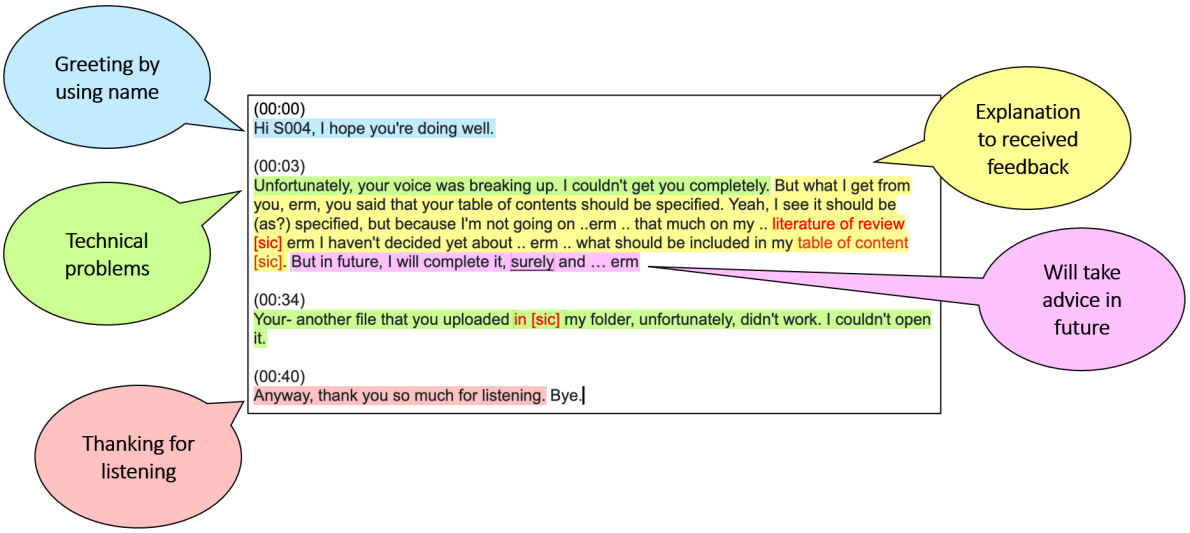


Figure 98: Analysis of S003's Recorded Response to S004's Feedback

The second example is S003's response to her feedback from S002 shown in Figure 99.

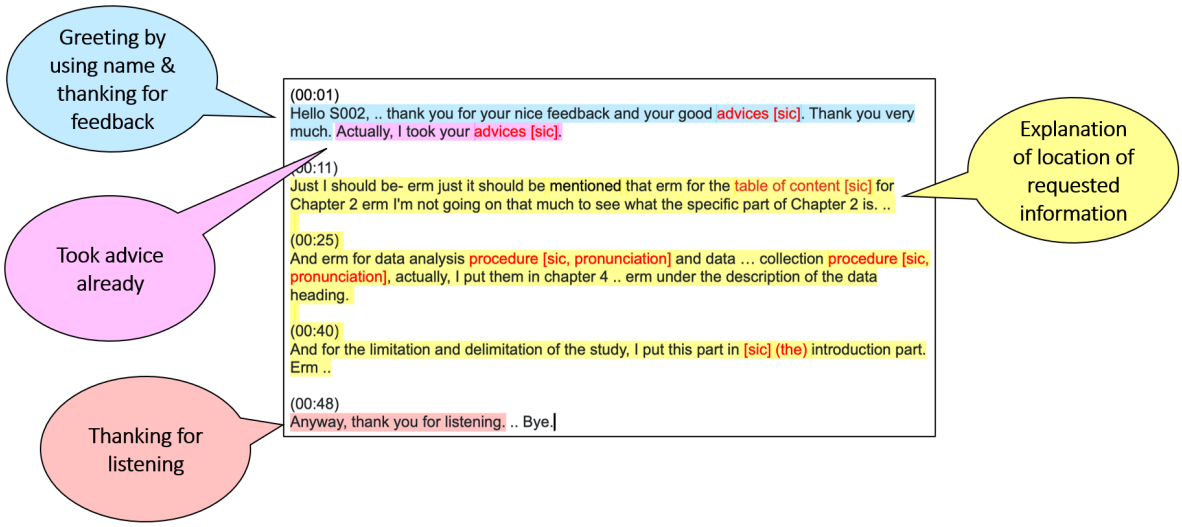


Figure 99: Analysis of S003's Recorded Response to S002's Feedback

Here, S003 first greeted S002 by using her name, thanked for her feedback and stated that she had incorporated her advice. Then, she explained where some of the requested information could be found. Lastly, she thanked S002 for listening and closed with a goodbye.

Both responses consisted of similar components but differed in some details. First, in her response to S004, S003 did not thank her for the *feedback*, as she did in her response to S002 twice (even "very much"). Instead, she only thanked S004 for *listening*. Second, she informed S004 that she would consider her advice *in the future*, whereas she told S002 that she took her advice *already*.

4.8.11. Summary of Findings from the Recorded Feedback Analysis

During this phase of the research planning process, N=16 audio and N=11 screencast files were created. Thereof, one screencast video included a talking-head video, but the video image appeared for only 00:10min in the introductory part. Two students (S003 and S004) created two separate recordings each for their peers, one for the first document (work plan) and one for the second file (table of contents). To compare their recordings with the others, their length and codings were added up to 23 files in total.

In sum, 01:01:17h were recorded and analyzed, with the audiocasts comprising a total of 00:38:02h and the screencasts 00:23:15h. The average duration of all 23 files (aggregated from 27 separate recordings) was 02:40min with a calculated standard deviation of 01:32min. Yet, N=6 audiocasts and N=2 screencasts were classified as extreme cases, as they were shorter than 01:00min (4 cases) and longer than 04:00min (4 cases). The average length of all remaining 15 files was 02:33min with a standard deviation of 01:04min.

In the 23 (summed up from the 27) files, a total of 3,159 codings were applied, which equals M=137.35 codings per file. Audiocasts were coded 1,859 times in total with an average

of M=123.93 codings per file. Screencasts received 1,300 codings, with M=162.50. The file containing most codings was the screencast for S008 by S014 with 299 codings in total (and a length of 05:40min). The file with the lowest amount of codings was S006's screencast for S007 with 31 codings, which was the shortest file with only 00:31min.

In the feedback, four likely purposes were identified: motivation, reflection/inspiration, correction and reassurance for correct understanding. Motivation appeared to be the main purpose of the feedback. Noticeably, it was given almost equally often in specific as in non-specific positive feedback. Furthermore, every sequence of non-specific positive feedback appeared to pursue motivational purposes. Finally, there was no sequence of negative feedback with the purpose of motivating.

The category "references" subsumed statements about personal experience or prior communication or other peer's work (within their peer group of 3 students). Most of the students knew each other from the seminar or from the English Department and seemed to have had conversations about their theses before. Furthermore, some shared their working experience in the field of teaching.

The categories for feedback method, feedback purpose, references, and author's response to feedback were new as compared to the preceding screencast feedback study (Schluer, 2021b; 2022b). As for the subcategories, several new categories likewise emerged. For example, with regard to the feedback contents and structures, new codes in the introduction were: glad to provide help, introduce oneself, great to see progress, hope feedback recipient is doing well, and interesting topic. In the main body of the feedback, most comments were about the content of the work plans/table of contents but addressed aspects of language or form only rarely (4 instances). In the concluding part, new categories were added as well: good luck/best wishes, interesting topic/research, and looking forward to seeing progress/reading thesis. Interestingly, the given feedback was not summarized as it usually was in the preceding screencast feedback project (Schluer, 2021b; 2022b).

Overall, negative and positive feedback were provided almost equally often. However, some positive feedback was non-specific, whereas no non-specific negative feedback was given. Furthermore, there were two sequences of unclear tendency, i.e. the valence of feedback was hard to determine.

Among the verbal/auditory strategies, personal pronouns occurred the most, followed by hedges/boosters, linguistic fillers, auditory emphasis, oral comment types, oral reference to text, and paralinguistic communication. No background music was added to the audio- or screencasts. All in all, the "you" perspective predominated among the three perspectives ("I", "you", "we"), closely followed by "I"-related pronouns. Furthermore, audiocasts included more pronouns, notably the pronoun "I", which constituted a statistically significant difference ($p<0.05$) compared to the screencasts. Two newly added categories of verbal/auditory strategies were linguistic fillers and paralinguistic cues. Non-lexical fillers like "erm" and

paralinguistic elements such as giggles and laughter appeared remarkably often, which reflects the more conversational nature of the current recordings in comparison to former studies on screencasts (Schluer, 2021b; 2022b).

The use of visual strategies in the 11 screencasts was relatively rare. Overall, just one category was detected, which was cursor movements. Within this category, the most coded visual aspects were scrolling through document, pointing or circling with cursor, cursor moving unintentionally/to blank space, cursor moving to/clicking on button, cursor drawing object, and marking passages with cursor.

Turning to errors in the feedback, we observed that the most frequent error type was grammatical in nature, followed by word choice errors and pronunciation errors. In contrast to the foregoing screencast feedback study (Schluer, 2021b; 2022b), no content and spelling errors occurred in the feedback.

In terms of feedback replies, there was only one person who created recordings as a feedback follow-up. More precisely, S003 recorded two audiocasts in response to the feedback provided by her peers (S002 and S004). Both replies had similar components; however, they differed in some details.

The voice and/or screen-recording in this feedback phase simultaneously served as a preparatory practice for creating a screen-recorded thesis presentation in the next step. This was followed by peer feedback in an online forum, which will be examined in the subsequent section.

4.9. Results from the Forum Feedback Analysis

Students created a screen-recorded presentation of their research proposal and shared it on the course cloud two days before their self-selected discussion date. The peers then watched the presentation asynchronously and composed entries in their peers' online forums on OPAL. Overall, there were N=14 persons participating in this forum feedback activity. However, only 10 forums (for 8 Master students and 2 prospective doctoral students) were commented on. The remaining persons had either presented on an earlier occasion already or planned to do so later (in the next term). More precisely, two doctoral students (S001 and S004) had presented in a live meeting beforehand so that there only was a synchronous discussion, but no asynchronous feedback in the forum. Moreover, two others (prospective doctoral students S002 and S014) postponed their presentation to the next semester. Nonetheless, these four persons provided feedback in some forums, as shown below. Additionally, S016 was a new student who joined the course late and did not participate in the previous feedback tasks.

4.9.1. Overview of Forum Entries and Codings

In total, the participants created 62 forum entries in 10 forums. The detailed breakdown of feedback entries and recipients' responses is shown in Table 55.

Table 55: Overview of Forum Entries, Responses and Codings

Forum feedback recipients	Forum feedback		Recipients' responses		Total number of codings in forums
	Number of entries	Codings	Number of responses	Codings	
S003	5	155	0	0	155
S005	8	296	8	229	525
S006	9	313	0	0	313
S007	8	223	0	0	223
S008	7	192	0	0	192
S009	6	169	0	0	169
S011	5	186	1	21	208[12]
S012	5	168	0	0	168
S013	6	148	0	0	148
S016	3	108	0	0	108
10	**62**	**1,958**	**9**	**250**	**2,209**

As can be seen, S006 received the most forum entries (N=9), S016 the least (N=3). Additionally, N=9 replies to the received feedback were given by N=2 students, S005 and S011. More precisely, S005 replied to every entry (9 responses), whereas S011 responded to just one (out of 5). Interestingly, S011's only response was on an entry made by S005. Furthermore, one announcement had been inserted by S011 at the beginning of her forum. Here, S011 announced the upload time of her presentation and thanked for the feedback in advance:

> "**My presentation is available from 9 pm on Sunday. 22/01/2023**
>
> Thank you so much in advance for your comments and feedbacks [sic]."
>
> (Announcement by S011 in her forum; emphasis in original as it was written in the post title)

As a first step of the analysis, the code system from the digital board analysis (see section 4.7.1) was imported into a new MAXQDA file, since both dealt with written feedback (further modalities were not seized on the digital board even though this would have been possible). However, not all of them turned out to be relevant, as the zero figures in Figure 100 indicate.

[12] Additionally, there was one announcement by S011 in her forum, which resulted in 208 as the total number of codings instead of 207.

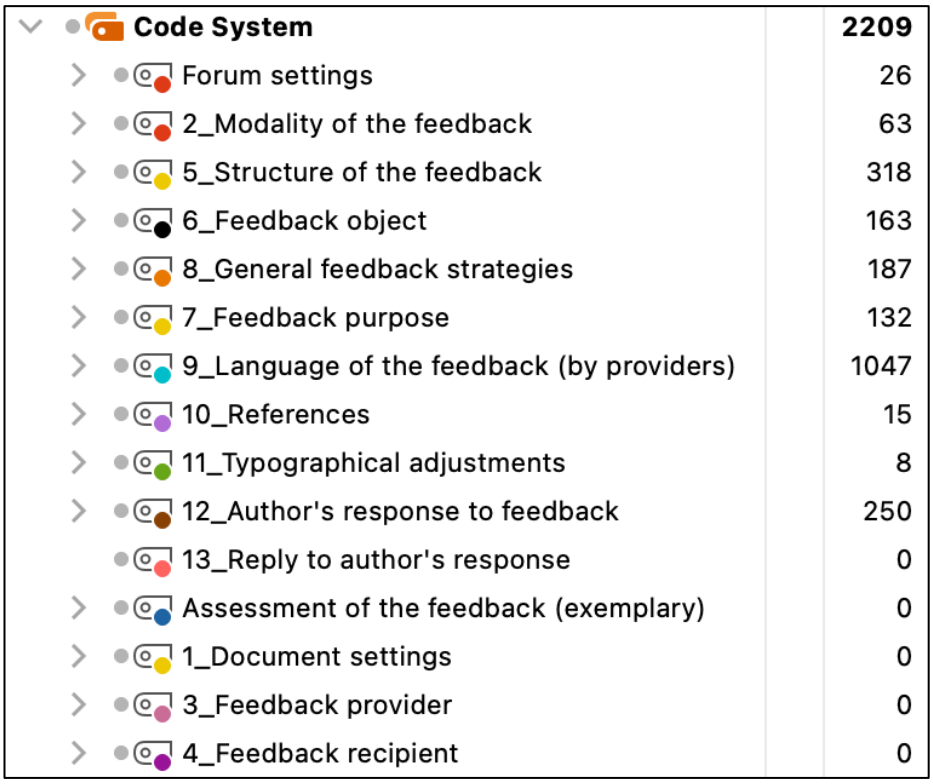


Figure 100: Overview of Codings for Forum Feedback

In contrast to the digital board analysis, the codings of feedback providers and recipients were superfluous as they became immediately apparent in the exported entries. Hence, while all contributions were visible at once on a digital board, it was possible to save single forum entries separately as PDFs, which thus facilitated the coding. Also, the category "Document/board settings" was changed to "Forum settings", which is only a minor change in naming, though. Nevertheless, the available configurations differed from tool to tool. Furthermore, no reply to an author's (here: presenter's) response was given, which resembled the recorded feedback activity but contrasted with the digital boards. Accordingly, the following categories were examined and defined as shown in Table 56.

Table 56: Main Categories and Definitions Used for the Analysis of Feedback in Online Forums

Category	Definition
Forum settings	Layout and commenting features enabled by the forum and/or utilized by the forum contributors
02_Modality of the feedback	Commenting by posting a forum entry (as text, hyperlinks) and/or through file uploads (e.g. documents, audio, video)
05_Structure of the feedback	Structural make-up, i.e. main elements of the feedback post (e.g. introduction, body, conclusion)

Category	Definition
06_Feedback object	Content area or assessment dimension on which feedback is given (e.g. research methods, clarity and manner of presenting)
08_General feedback strategies/ Valence	Positive comments or criticism, e.g. outlining strengths and errors/ areas for improvement (with varying degrees of detail)
07_Feedback purpose	The feedback function or likely intention pursued by giving feedback (e.g. to motivate, correct or inspire)
09_Language of the feedback (by providers)	Feedback provider's language use or linguistic strategies (e.g. utilization of hedges/ boosters, pronouns, sentence types)
10_References	Mentioning sources, own knowledge or communication in or outside of the online forum
11_Typographical adjustments	Textual visual strategy to attract or direct attention (e.g. use of bold print or capitalization of words or word parts)
12_Author's response to feedback	Recipient's reply to the feedback, including its structural composition as well as linguistic characteristics

The next sections will outline the findings in the order of the categories.

4.9.2. Forum Settings and Features

Compared to the Padlets, the features of the OPAL forum were more limited in their settings. As shown in Figure 101, it was possible to upload a profile photo, as was done by S012 only (visible in 4 entries, but anonymized for the presentation of results), or to give a "thumbs up"/like (in 22 entries, i.e. in 35.48% of all 62 entries). Unfortunately, information about who gave a "thumbs up"/like was unavailable on OPAL.

Figure 101: Overview of Codings of Forum Settings

To illustrate, Figure 102 is an example of an entry created for S005, in which S012's profile photo was visible (anonymized in the screenshot), and in which the "thumbs up" was utilized once ("1") in the bottom right corner.

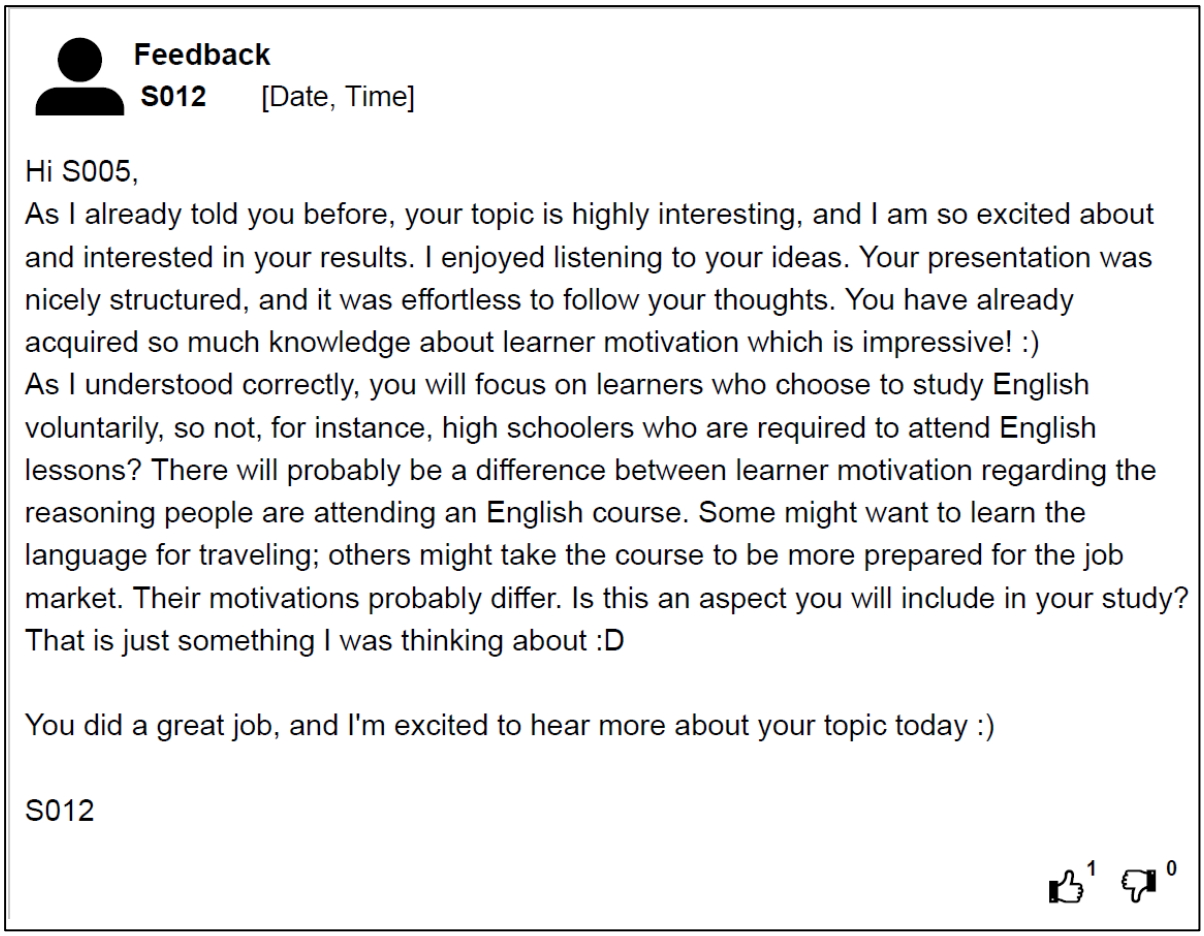


Figure 102: Sample Forum Entry Provided to S005 by S012

It should be noted that the forum features of OPAL are probably more limited than other online forums (internal or external to other learning management systems). Accordingly, additional forum functions would be worth further investigation in the future.

4.9.3. Feedback Modality

All forum entries were text comments provided in response to N=10 peer presentations (N=62 feedback entries plus N=1 announcement). The upload function of the forums was not utilized by the students, even though this would have enabled further feedback modalities, such as audio or voice comments.

4.9.4. Feedback Structure

The analysis of the forum entries yielded three main parts that occurred in most messages: introduction, main part/actual feedback, and goodbye/outro. As shown in Figure 103, an introduction was found in most peer comments (N=58, i.e. 93.5%).

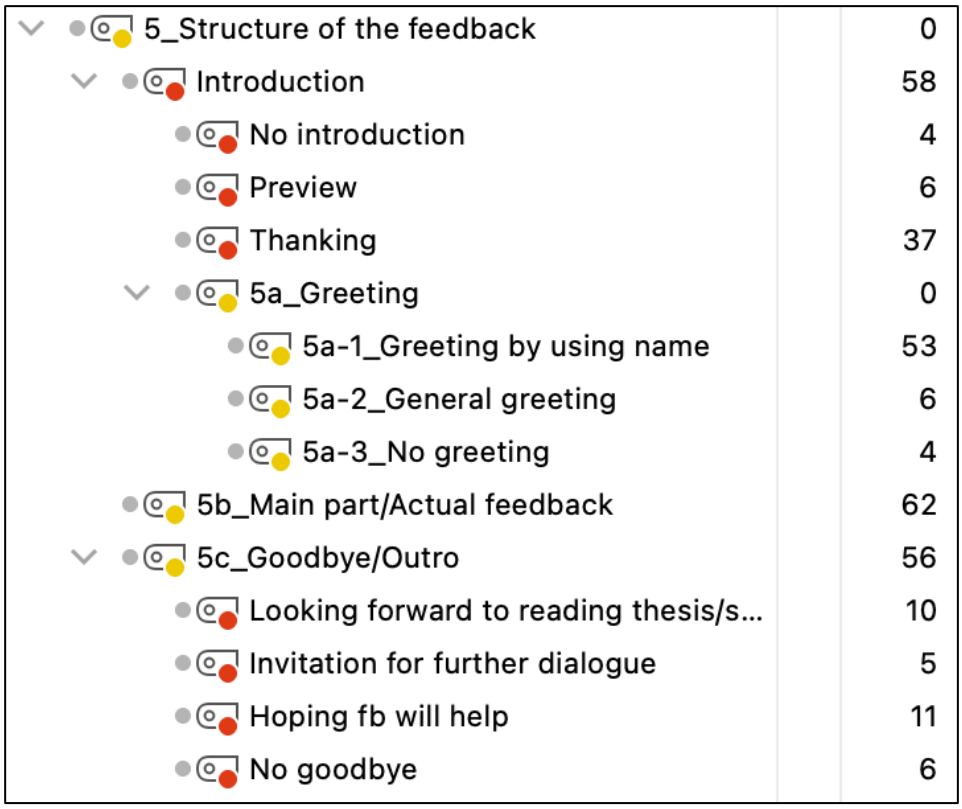


Figure 103: Categories for the Structure of Forum Feedback Entries

The introduction always included a greeting and often a thanks for presenting the thesis (in 37 entries, i.e. 60.0%). N=53 entries (85.0%) started with a greeting using the peer's name, N=6 contained general greetings (such as "Hello" or "Hi there"), and only N=4 were without any greeting. One entry (addressed to S013 by S011) even included 2 greetings, a greeting by using name ("Dear S013") and a general greeting ("Hello :)").

Additionally, in N=6 instances, "previews" were produced, which are here defined as statements that announce the following part of the entry, as in the red-colored passages of Figure 104 and Figure 105.

Hi S006 ,

It was a pleasure to hear your ideas. Integrating social media is definitely a timely and novel research idea.

I have just noted down a few questions in the following, which may help you to think about your research project:

1- What kind of activities are you planning to integrate into your research to measure speaking abilities and communicative competence?

2- What do you mean by communicative competence? Speaking has a number of sub-skills. You might need to look into them more in detail and decide what exactly you refer to as communicative competence? That may help you to specify the scope of your research. Maybe, some researches that have been conducted in the area of your research interest may guide you to shape your ideas.

I hope it helps!

Bye,
S004

Figure 104: Forum Feedback Provided to S006 by S004

Dear S003 ,

Thank you for presenting your research. I would like to give you a couple of points you might want to consider on at some point in your research process:

1. The title, while very informatice, is rather long. You should consider making a shorter more concise version of it so that the viewers/readers can understand it quicker. I would suggest something like: **"The comparative effectiveness of digital-multimodal and written commentary feedback on learner writing development"**
2. For further presentations, you should probably create a second version of the pptx where the slides only show the titles and subtitles of the thing you will talk about. It is clear that you are knowledgeable of your topic, but instead of putting all the information on the slide, it might be better to just have a title on the slide, with a few phrases generally explaining your research question and then have everything you want to say on a private note. eg: the slide concerning the research question would look something like the following:

Written commentary vs. Multimodal-screencast feedback:

- Effect on writing development
- Effect on writing characteristics
- Students' perception and preferance

Figure 105: Forum Feedback Provided to S003 by S005 (Excerpt)

Hi S005 ,

It is great to see that you have already specific ideas about your research and some references to the existing studies in your field. Here are some questions which you might want to think of:

- How are you planning to find answer to your second research question? Does it not sound much like a question that would go under literature review?
- In the literature review, I have seen various aspects on motivations. Have you decided which theoretical framework will shape your study methodology the most? You might think of refining the literature review.
- Under methodology part (07.42 min. of the presentation), I see some questions. Are they your additional research questions? How do they relate to the research questions which you stated at the beginning of the presentation?

I hope it helps!

Please contact me over email if you have any further questions. I won't be able to join the session tomorrow due to work.

S004
EMAIL ADDRESS OF S004

1 0

Figure 106: Forum Feedback Provided to S005 by S004

Hello, S007! Thank you for the presentation, which I find extremely interesting. Although the topic is quite interesting, I find it a bit tricky, as to how to employ such a widely-used app in flipped learning. I also look forward to reading the full version of your thesis!

Thank you and best of luck!

0 0

Figure 107: Forum Feedback Provided to S007 by S008

Moreover, most entries (N=56, 90.3%) concluded with a goodbye/outro; only 6 entries did not have one. In 11 entries, the feedback providers hoped that the given feedback would help. N=10 contributors mentioned that they were looking forward to reading the thesis or seeing progress. Finally, N=5 providers invited the feedback recipient to further dialogue. For example, S004 even included her email address in the closure (coded in yellow in Figure 106) as she was not able to join the live discussion in the ensuing seminar session. In another example (Figure 107), S008 stated that she was looking forward to reading S007's thesis as soon as it is completed.

4.9.5. Feedback Objects/ Contents (Assessment Criteria)

In the N=62 forum entries, 13 feedback objects were identified. In part, they overlapped with the content categories of previous feedback activities (N=4; colored in black in Figure 108), others did not recur (N=4; colored in black but with zero codings), whereas several new ones emerged (colored in red without enumeration in Figure 108).

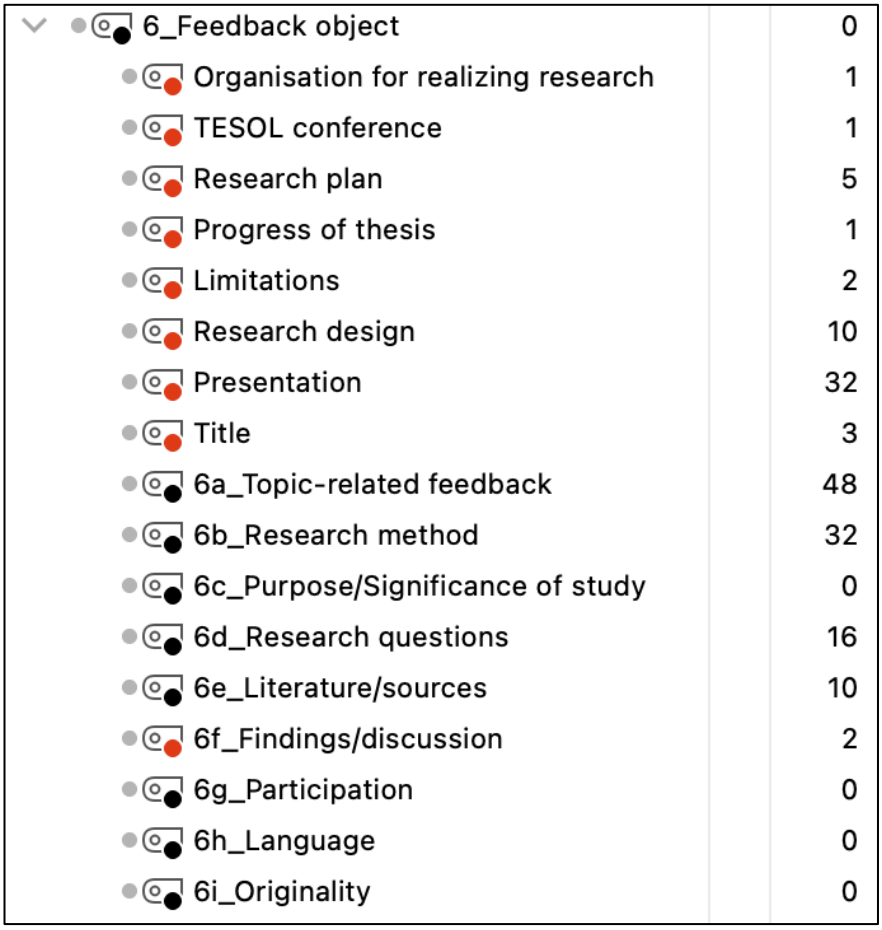


Figure 108: Overview of Feedback Content Categories for Forum Feedback

The distribution of the codings across the 10 forums and 62 entries is given in Table 57 for a more precise overview.

Table 57: Distribution of Feedback Content Categories in Total, per Forum and per Forum Entry

Content category	Total codings (N=115)	Mean per forum (N=10)	Mean per forum entry (N=62)
Topic-related	48	4.8	0.77
Research method	32	3.2	0.52
Presentation	32	3.2	0.52
Research questions	16	1.6	0.26
Literature/sources	10	1.0	0.16
Research design	10	1.0	0.16
Research plan	5	0.5	0.08
Title	3	0.3	0.05
Limitations	2	0.2	0.03
Findings/discussion	2	0.2	0.03
Organization for realizing research	1	0.1	0.02
TESOL conference	1	0.1	0.02
Progress of thesis	1	0.1	0.02

Most feedback in the forums was topic-related (per forum: M=4.8; per forum entry: M=0.77) or about the research method (per forum: M=3.2; per forum entry: M=0.52) and the presentation (per forum: M=3.2; per forum entry: M=0.52). This was followed by feedback on the research questions (per forum: M=3.2; per forum entry: M=0.26), literature/sources (per forum: M=1.0; per forum entry: M=0.16), research design (per forum: M=1.0; per forum entry: M=0.16), research plan (per forum: M=0.5; per forum entry: M=0.08), title (per forum: M=0.3; per forum entry: M=0.05), limitations (per forum: M=0.2; per forum entry: M=0.03), findings/discussion (per forum: M=0.2; per forum entry: M=0.03), organizational aspects for realizing the research (per forum: M=0.1; per forum entry: M=0.02), the TESOL conference (per forum: M=0.1; per forum entry: M=0.02), and the progress of the thesis (per forum: M=0.1; per forum entry: M=0.02). The three points mentioned last only occurred once overall.

For example, S005 started with general feedback on S007's topic (highlighted in the quote), before providing more specific feedback on the research method:

> "Dear S007,
>
> Thank you for your presentation. **It seems like the topic is one that you greatly interested in, which makes the whole research process enjoyable and hopefully more fruitful.** The only feedback I would give you is that the approach you are taking is that of a longitudinal study, and that if not designed with maximum impact in mind, the curriculum might not be influential enough to show a significant difference in student proficiency over the duration of your study. Keeping that in mind while designing the curriculum will help you design an impactful plan,

and will hopefully give you significant results. I wish you all the best in your research moving forward.

Best regards,

S005" (Forum Feedback Provided to S007 by S005; emphasis added)

From another peer (S012), S007 received feedback on her presentation style: "Thank you for your interesting presentation. You spoke clearly and I enjoyed that you included illustrations an [sic] images on your slides." Afterwards, S012 continued with reflective questions about the app chosen for S007's study.

Lastly, one category which might need further explanation is the "TESOL conference" that was cited once. More precisely, S001 mentioned in her feedback to S011 that "This digital tool could be useful for the conference in June 2023. You may give a brief presentation at the conference." At the point of data collection for the forum entries (January 2023), some students might have heard of the digital feedback conference that was about to take place in June and that was hosted by the course instructor. S001's reference can be understood against this background (for more details on references, see section 4.9.9).

4.9.6. Positive and Negative Feedback

By analogy to the foregoing analyses, the occurrences of (non-)specific positive and negative feedback were coded. This resulted in the codings shown in Figure 109.

8_General feedback strategies	0
8a_Positive feedback	0
8a-1_Specific positive feedback	0
Sequence of pos. fb	46
Explanation to pos. fb	32
Recommendation to pos. fb	31
8a-2_Non-specific positive feedback	17
8b_Negative feedback	0
8b-1_Specific negative feedback	0
Sequence of neg. fb	25
Explanation to neg. fb	10
Recommendation to neg. fb	26
8b-2_Non-specific negative feedback	0
8c_Unclear tendency of feedback (pos. or neg.)	0

Figure 109: Overview of Codings for Positive and Negative Forum Feedback

The means per forum and forum entry, respectively, are given in Table 58.

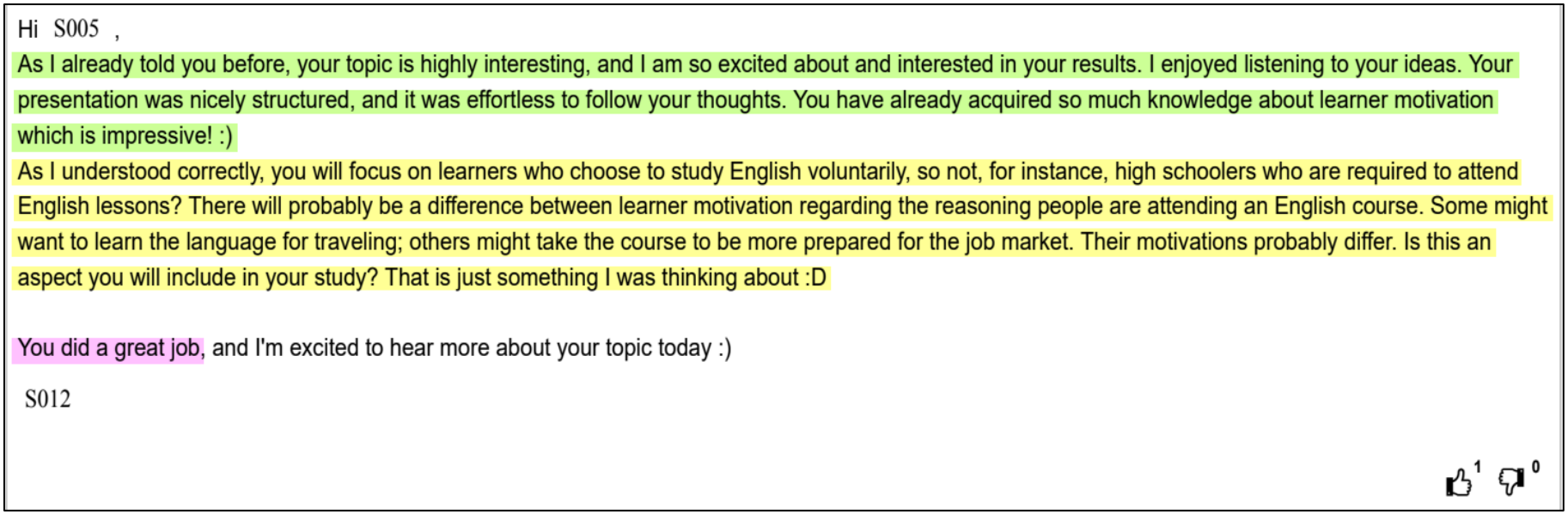
Table 58: Positive and Negative Forum Feedback in Total, per Forum and per Forum Entry

General feedback strategies	Total	Mean per forum	Mean per forum entry
Unclear tendency	0	0	0
Specific negative feedback			
- Sequence about negative feedback	25	2.5	0.4
- Explanations	10	1	0.16
- Recommendations	26	2.6	0.42
Specific positive feedback		0	
- Sequence about positive feedback	46	4.6	0.74
- Explanations	32	3.2	0.52
- Recommendations	31	3.1	0.5
Non-specific positive feedback	17	1.7	0.27

As can be seen, most comments constituted specific positive feedback (per forum: M=4.6; per forum entry: M=0.74). Sequences of specific negative feedback appeared M=2.5 times per forum and M=0.40 per forum entry. Hence, positive instances of specific feedback occurred almost twice as frequently as negative ones. Furthermore, some non-specific positive feedback was given (per forum: M=1.7; per forum entry: M=0.27), whereas no non-specific negative feedback was detected. Also, no feedback with unclear tendency/valence was found, which stands in contrast to the feedback analysis of the Padlets and digital recordings.

In S012's forum feedback provided to S005, we find specific positive feedback (marked in green in Figure 110), followed by a question for clarification that could be understood as a recommendation for further improvement (yellow), before the message ends with non-specific positive feedback (pink). Similarly, S009 provided specific positive feedback to S006 first (green) and continued with specific negative feedback with recommendations (yellow in Figure 111).

This positive–negative feedback pattern recurred in several other forum messages, sometimes repeatedly, as in S012's feedback to S016. To exemplify, S012 started with specific positive feedback about S016's topic, gave specific negative feedback on her presentation, continued with specific positive feedback on the topic and ended with specific negative feedback including recommendations about the research methods.


Hi S005 ,

As I already told you before, your topic is highly interesting, and I am so excited about and interested in your results. I enjoyed listening to your ideas. Your presentation was nicely structured, and it was effortless to follow your thoughts. You have already acquired so much knowledge about learner motivation which is impressive! :)

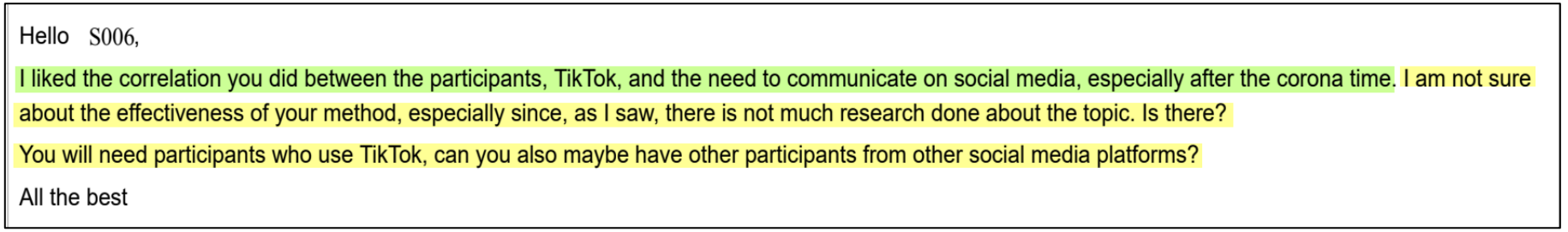
As I understood correctly, you will focus on learners who choose to study English voluntarily, so not, for instance, high schoolers who are required to attend English lessons? There will probably be a difference between learner motivation regarding the reasoning people are attending an English course. Some might want to learn the language for traveling; others might take the course to be more prepared for the job market. Their motivations probably differ. Is this an aspect you will include in your study? That is just something I was thinking about :D

You did a great job, and I'm excited to hear more about your topic today :)

S012

1 0

Figure 110: Forum Feedback Provided to S005 by S012


Hello S006,

I liked the correlation you did between the participants, TikTok, and the need to communicate on social media, especially after the corona time. I am not sure about the effectiveness of your method, especially since, as I saw, there is not much research done about the topic. Is there?

You will need participants who use TikTok, can you also maybe have other participants from other social media platforms?

All the best

Figure 111: Forum Feedback Provided to S006 by S009

4.9.7. Feedback Purpose

In the forum feedback activity, only N=3 out of the four previously identified feedback purposes were detected, as shown in Figure 112.

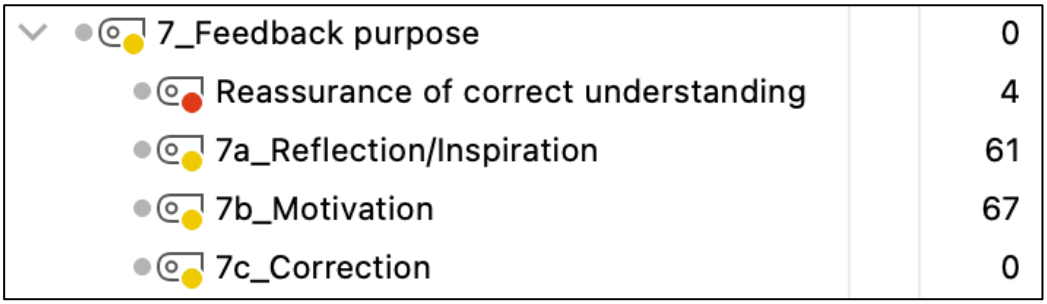


Figure 112: Overview of Feedback Purposes in Forum Feedback

Most forum comments appeared to have motivational purposes (in N=67 cases; per forum: M=6.7; per forum entry: M=1.08), followed by reflection/inspiration (N=61; per forum: M=6.1; per forum entry: M=0.98) and reassurance of correct understanding (N=4; per forum: M=0.4; per forum entry: M=0.04). No corrective feedback was given. For instance, positive feedback with the purpose of motivation was offered by S014 to S005:

> "[…] You already know how much I love the topic itself, but the presentation was just as great. It was so well-structured and elaborate I very much enjoyed listening/watching. From your presentation, I gather that you've already made yourself familiar with the approaches, theories, and situations playing a role in your research. Film is such a highly complex medium, and I do understand that the socio-political aspects may be challenging. However, I am sure that you will find a way to navigate these difficulties. […]" (Forum Feedback Provided to S005 by S014)

We find a similar instance of topic-related motivational feedback in S014's post to S006:

> "[…] Your topic sounds very interesting and is surely relevant at the current time. I personally do not use TikTok, but I remember asking my 6th-grade students about their favorite influencers and they were all TikTokers – so good job on finding a relevant research topic. 😊 […]" (Forum Feedback Provided to S006 by S014)

In turn, specific negative feedback with recommendations that intended to trigger reflection constituted a common combination as well. One example was already depicted in Figure 104 (S004's forum feedback to S006); another one in Figure 105 (S005's forum feedback to S003). In both cases, the feedback providers listed a few points for further consideration by their peer.

Finally, the following three questions had the purpose of "reassurance of correct understanding":

> "As I understood correctly, you will focus on learners who choose to study English voluntarily, so not, for instance, high schoolers who are required to attend English lessons?" (Forum Feedback Provided to S005 by S012)
>
> "I don't know if I missed this part of the presentation, but is the second research question also focusing on the learner age group or will it apply to film/TV use and motivation in general?" (Forum Feedback Provided to S005 by S014)
>
> "I am not sure about the effectiveness of your method, especially since, as I saw, there is not much research done about the topic. Is there?" (Forum Feedback Provided to S006 by S009)

The formulation as questions as well as the expressions used in them (e.g. "I don't know if …", "I am not sure about …") lead us to examining the language use in the feedback more deeply.

4.9.8. Linguistic Analysis of the Forum Feedback

Most categories from the foregoing analyses likewise applied to forum feedback, as the codings in Figure 113 indicate.

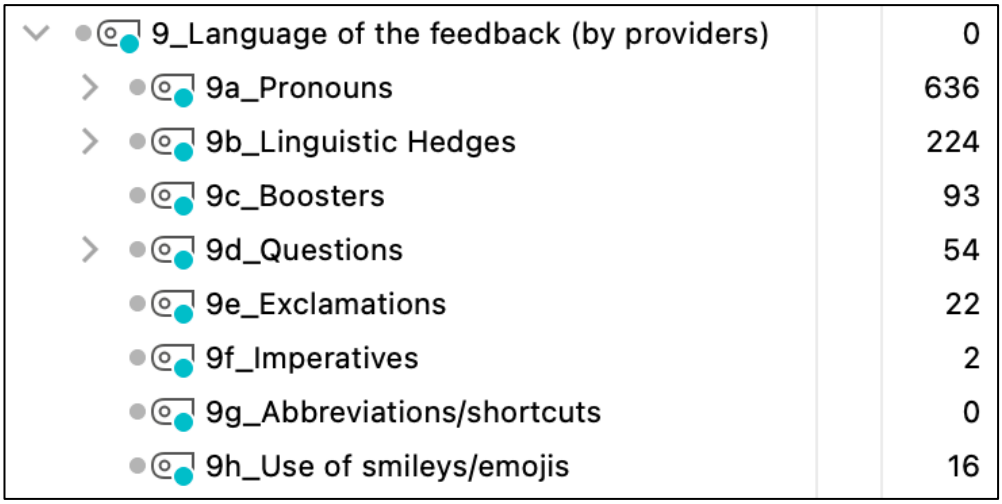


Figure 113: Overview of Codings for Language of the Forum Feedback

The majority of coded segments pertaining to the language of the feedback were pronouns (N=636 instances) and linguistic hedges (N=224). Boosters were included in N=93 instances, N=54 questions were asked, N=22 exclamations were made, N=16 smileys/emojis were inserted, and N=2 imperatives were used. Table 59 details the distribution of the codings for the pronoun subcategories.

Table 59: Overview of Personal Pronouns in Total, per Forum and per Forum Entry

Personal pronouns	Total	per forum	per forum entry
"I" perspective	176	17.6	2.84
"I"	162	16.2	2.61

Personal pronouns	Total	per forum	per forum entry
"me"	6	0.6	0.1
"my"	8	0.8	0.13
"you" perspective	452	45.2	7.29
"you"	270	27	4.35
"your*"	182	18.2	2.94
"we" perspective	8	0.8	0.13
"we"	1	0.1	0.02
"our"	2	0.2	0.03
"us"	5	0.5	0.08
All pronouns (total)	**636**	**63.6**	**10.26**

Per forum, M=63.6 personal pronouns were employed, which equals an average of M=10.26 per forum entry. Thereof, the "you" perspective predominated with M=45.5 occurrences per forum or M=7.29 per entry. With much difference, it was followed by the "I" perspective, occurring M=17.6 times per forum or M=2.84 per entry. The inclusive "we" perspective surfaced only N=8 times in the data in total and hence M=0.8 times per forum or M=0.13 times per entry. There are thus substantial differences in the frequency of these pronoun groups, with "you" pronouns accounting for 71.1%, "I" pronouns for only 27.6%, and "we" pronouns taking just a negligible share of 1.3%. The remaining linguistic phenomena were coded as follows (Figure 114):

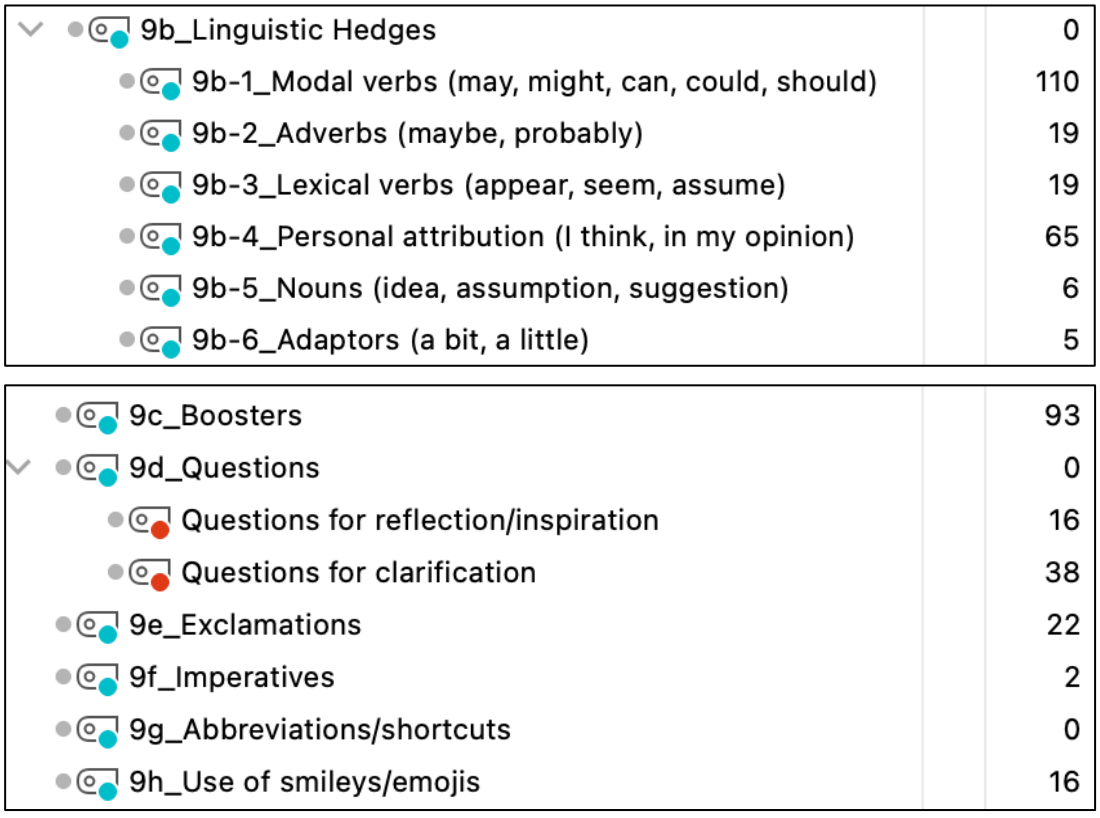


Figure 114: Overview of Verbal Strategies in Forum Feedback (Except for Pronoun Use)

Moreover, the distribution across the forums and forum entries is given in Table 60.

Table 60: Verbal strategies (Except for Personal Pronouns) in Total, per Forum and per Forum Entry

Verbal strategies	Total	Mean per forum	Mean per forum entry
Linguistic hedges	224	22.4	3.61
- modal verbs	110	11	1.77
- adverbs	19	1.9	0.31
- lexical verbs	19	1.9	0.31
- personal attribution	65	6.5	1.05
- nouns	6	0.6	0.1
- adaptors	5	0.5	0.08
Linguistic Boosters	93	9.3	1.5
Questions	54	5.4	0.87
- for reflection/inspiration	16	1.6	0.26
- for clarification	38	3.8	0.61
Exclamations	22	2.2	0.35
Imperatives	2	0.2	0.03
Abbreviations/shortcuts	0	0	0
Use of smileys/emojis	16	1.6	0.26

Per forum, M=22.4 linguistic hedges and M=9.3 boosters were used. This equals an average of M=3.61 linguistic hedges and M=1.50 linguistic boosters per forum entry. There were thus more than twice as many hedges than boosters in the forums. Concerning the pronouns, modal verbs were predominant, accounting for nearly 50% of all occurrences.

With regard to the sentence types, statements were again assumed as the default and therefore not coded. In the forums, 54 questions were asked in total, which amounts to M=5.4 questions per forum. Around 30% of them were questions for reflection (N=16; M=1.6 per forum), about 70% were questions for clarification (N=38; M=3.8 per forum). Altogether, this amounted to an average of M=0.87 questions per forum entry. Other comment types occurred even more rarely, with only N=2 imperatives in total. However, there were N=22 exclamations (i.e. about two per forum) as well as N=16 smileys or other emojis (i.e. M=1.6 per forum).

4.9.9. References

Virtually all reference categories from earlier coding rounds reappeared in the forum analysis (marked in violet in Figure 115).

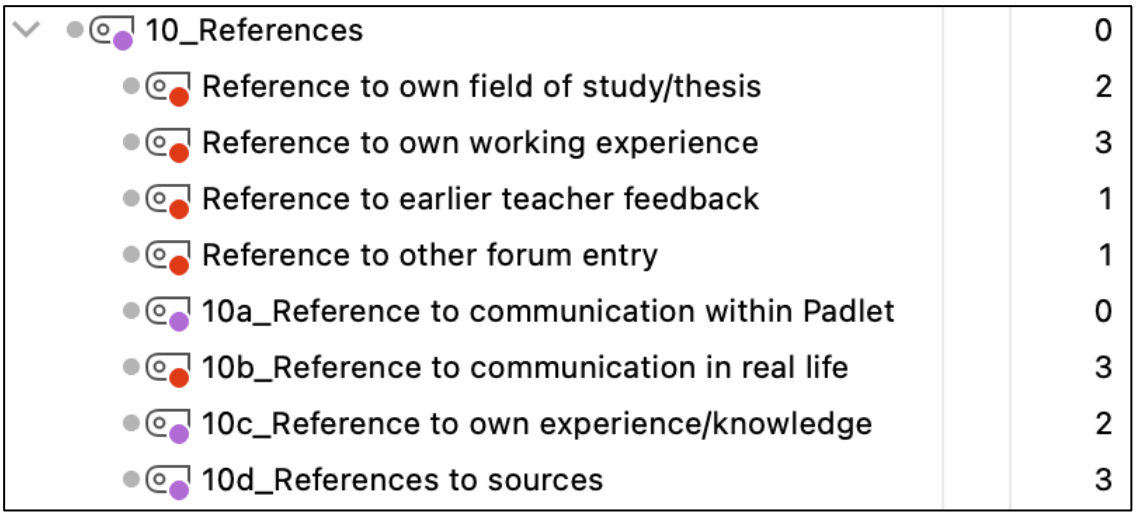


Figure 115: Overview of References in Forum Feedback

The category for board-internal references was modified to “Reference to other forum entry” due to the change in feedback method/tool. Such a reference type, however, did not exist in the recorded feedback (see section 4.8.4), probably because students did not listen to other peers’ recordings, found them harder to skim for already available information, or were only able to rely on the comments of one other peer instead of multiple peers.

Compared to the references made on the digital boards, N=5 new categories were identified (see unnumbered red dots in Figure 115):

- reference to communication in real life (N=3)
- reference to own working experience (N=3)
- reference to own field of study/thesis (N=2)
- reference to earlier teacher feedback (N=1)
- reference to other forum entry (N=1)

Reference to earlier teacher feedback (N=1) also did not yet occur in the recorded feedback activity. Neither were references to sources established in recorded feedback, but in forum feedback (N=3) as well as on the digital boards (see section 4.7.11).

For the total of the resultant seven reference categories, N=15 segments were coded. Hence, each category appeared only between one and three times in the data. With N=3 instances each, most references were made to communication in real life, to sources, or to own working experience. With N=2 codings, references to own experience/knowledge or to the peer’s own field of study/thesis were established. Furthermore, one occurrence of a reference to earlier teacher feedback and one to another forum entry were detected. Given the low overall amount of codings, conclusions cannot be drawn from this. However, some examples will be cited for illustration in Table 61.

Table 61: Examples of Different Reference Types in Forum Feedback

Reference Type	Quote	Forum entry
Reference to Earlier Communication in Real Life	"As I already told you before, your topic is highly interesting, and I am so excited about and interested in your results."	Provided to S005 by S012
Reference to Earlier Teacher Feedback	"I understand the point of view of Prof. Schluer, maybe you get more accurate data when you interview EFL teachers effectively."	Provided to S005 by S009
Reference to Own Working Experience as a Teacher	"I worked at Foreign Language Schools in Turkey. They usually use different course books."	Provided to S011 by S004
Reference to Other Forum Entry	"I agree with S005. I do understand that you want to fit lots of information into your title but the length is a bit overwhelming and confusing. I like S005's suggestion for a shorter title :-)"	Provided to S003 by S012
Reference to Literature Sources	"I see K. Noels (2009) as something that might interest you. Noel's concept of an L2 speaking self, and its impact on learners' skills as a good starting point."	Provided to S006 by S005
Reference to Own Field of Study/ Thesis	"Results of your study will probably be very interesting and useful for me in the future. I am looking forward to it."	Provided to S008 by S006

4.9.10. Typographical Adjustments

In total, merely N=8 typographical adjustments were observed in the 62 forum entries. However, they pertained to five different categories, as listed in Figure 116.

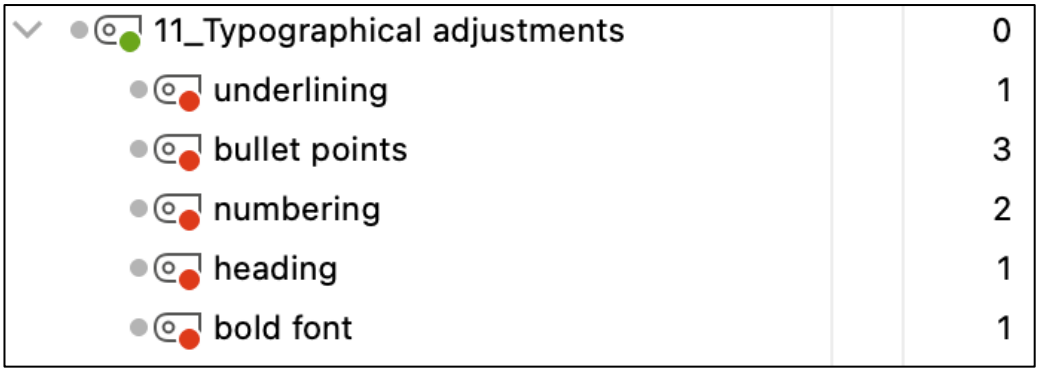


Figure 116: Overview of Typographical Adjustments in Forum Feedback

Bullet points and enumerations were most common, as exemplified in Figure 106 (S004's forum feedback to S005) and Figure 105 (S005's forum feedback to S003), respectively. S005 even employed three different categories in his feedback to S003: enumeration, bold font, and headline (probably, the heading was copied from the presentation and therefore led to an

inconsistent formatting). Again, due to their rare occurrence in the present data set, a larger sample would be needed to perform further analyses and draw conclusions.

4.9.11. Author's Response to Forum Feedback

Overall, only two students (S005 and S011) responded to the feedback they received. S005 replied to all of forum entries (N=8) and S011 responded to only one peer. Consequently, there were 9 responses in total. The main codes were as follows (Figure 117):

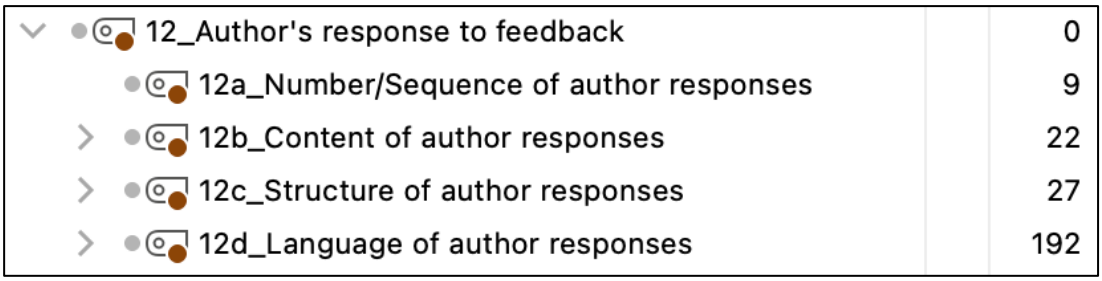


Figure 117: Overview of Categories for Author responses to Forum Feedback

Further coding details about the content and structure are shown in Figure 118.

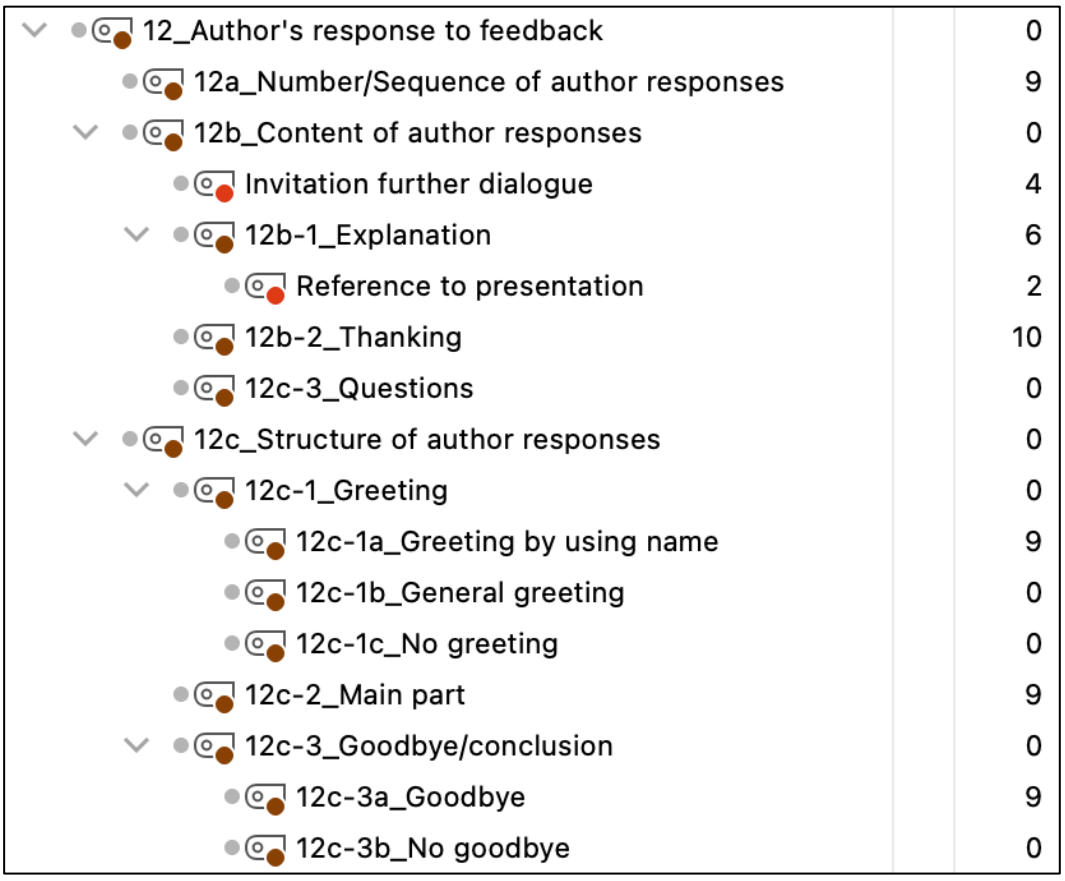


Figure 118: Codings of the Content and Structure of the Author Responses in the Forums

Structurally, we observe that each author response contained a greeting by using the name as well as a goodbye. Moreover, in every response, the author thanked the peer for the feedback;

S011 even thanked her peer twice in one response. In terms of content, the authors often provided an explanation (N=6), and in N=2 cases they referred back to their presentation.

S005 usually gave elaborate written answers to the peers' questions and comments. One of his shorter replies is depicted below for illustrative purposes:

> "Dear S013,
>
> Thank you very much for your feedback and I am very glad you enjoyed the presentation. As you mentioned, I am also leaning towards younger learners because I see them as more susceptible to intervention, but I am a little worried that it would be tougher to find teenage learners who choose to learn English as opposed to teenagers required to learn English by their school curriculum. I would like to specifically target the motivation to learn and the loss of motivation that makes learners abandon learning, rather than the impact on learning performance. I think the scope of the study would grow a lot if I target performance of students, and I'm not sure I would be able to accomplish that.
>
> Best regards,
>
> S005" (S005's Reply to S013's Forum Feedback)

As can be seen, S005 started his response with a greeting and expression of thanks. Next, he referred back to the comment made by S013 and provided explanations about his choice regarding the target group. Finally, he ended the reply with a goodbye formula. The excerpt also shows frequent occurrences of personal pronouns and hedges (such as "I think", "I would", "a little worried") as well as the booster "very".

Indeed, with N=192 codings overall, the language category contained most coded segments. As previously, a distinction was made between pronouns, linguistic hedges and boosters, sentence type (here exclamations only), and the use of smileys or emojis (see Figure 119).

In terms of pronouns, the "I" perspective predominated (N= 87; M=9.67), with more than twice as many codings compared to the "you" perspective (N=41; M=4.56). This also became obvious in the above-cited reply by S005 to S013's feedback. There was no "we" perspective in the author's responses.

With regard to mitigation and emphasis, we see that linguistic hedges occurred N=41 times in total (M=4.56) and thus almost four times as often as linguistic boosters (N=11; M=1.22). A bit less frequent than boosters were exclamations (N=9; M=1.0). Finally, N=3 smileys/emojis were used overall, and no questions were asked back.

The low amount of follow-up interactions in the forums is understandable, given that the entries were composed shortly before the selected discussion date. Hence, synchronous elaborations and clarifications were exchanged in the subsequent live meeting (see section 3.4).

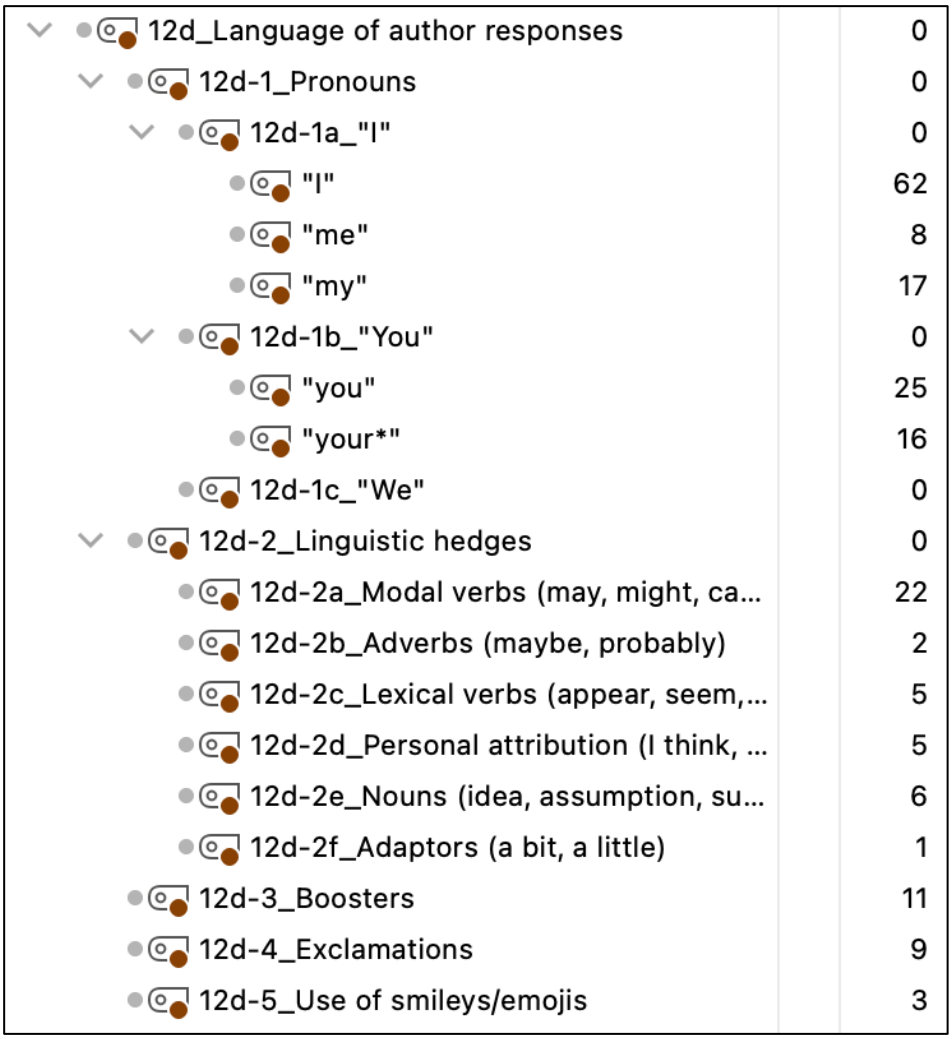


Figure 119: Codings of the Language of the Author Responses in the Forums

4.9.12. Summary of Findings from the Forum Feedback Analysis

Overall, 14 persons participated in the forum feedback activity. They were asked to give feedback on their peers' presentations on OPAL. However, only 10 forums (for 8 Master students and 2 prospective doctoral students) were commented on. The remaining persons had either presented on an earlier occasion already or planned to do so later (in the next term). Nonetheless, these four participants provided feedback in some forums.

Altogether, 62 forum entries were created in the 10 forums. S006 received the most feedback entries (N=9), S016 the least (N=3). Additionally, N=9 replies to the feedback were given by two students, S005 and S011. Furthermore, one announcement about the upload time was made by S011.

Compared to the digital boards, OPAL forums turned out to be more limited in their settings. It was possible to upload a profile photo, as was done by S012, or to give a "thumbs up"/like, as was visible in 22 entries (35.48% of all 62 entries).

The forum entries were structured into an introduction, main part/actual feedback, and goodbye/closure. In most entries, an introduction commonly included a thanks for presenting

the thesis as well as a greeting. One entry contained two greetings (S013 by S011): a greeting by using name and a general greeting. Most entries concluded with a goodbye/outlook. In 11 entries, the feedback providers hoped that the given feedback would help. 10 providers were looking forward to reading the thesis and seeing progress. N=5 peers invited the feedback recipient to engage in further dialogue.

In sum, N=13 feedback objects were detected, with most feedback being topic-related or about the research method or the presentation. Moreover, the majority of comments constituted specific positive feedback. There was no non-specific positive or non-specific negative feedback as well as no feedback with unclear valence.

Overall, three feedback purposes were identified. Most feedback was given with the purpose of motivation, followed by the purpose of reflection/inspiration, and reassurance of correct understanding. No corrective feedback was provided.

Most coded sequences pertaining to the language of the feedback were pronouns and linguistic hedges. Per forum, M=63.6 personal pronouns were utilized, which equals an average of M=10.26 personal pronouns per forum entry. The “you” perspective was used most, followed by the “I” perspective. The joint “we” perspective occurred the least. N=8 typographical adjustments were detected: underlining, bullet points, numbering, heading, and bold font.

In total, N=15 references from seven categories were found in the 62 forum entries. Most references were made to communication in real life, to sources, and to own working experience.

Overall, only two students (S005 and S011) responded to the feedback they had obtained. S005 answered all the forum entries he received (N=8) but S011 replied to only one. In every response, there was a greeting by using the name and a goodbye. Furthermore, the authors thanked for the feedback (in one response even twice). Typically, they provided explanations; in two cases they referred back to their presentation. Predominantly, the “I” perspective was used in the authors’ responses, followed by the “you” perspective. No “we” perspective was created and no questions were asked back.

Altogether, several similarities and differences between the three feedback rounds emerged during the analyses, which will be examined in more detail in the next section.

4.10. Comparative Consideration of the Feedback Product Analyses

In this section, the feedback on digital boards, in audio- and screencasts, and in online forums will be compared along their main analytical dimensions. These comprised the feedback modalities and tool options (section 4.10.1), the comment structures (section 4.10.2), the contents (evaluation criteria) and purposes of positive and negative feedback as well as the incorporation of references (e.g. to previous communication or external resources) (section 4.10.3), verbal/auditory and visual/written features (section 4.10.4), the feedback directions and further interactions (section 4.10.5).

4.10.1. Tool Options and Characteristics

The first aspect under investigation is the **feedback modality**. Even though digital boards and online forums allow for the insertion of voice or video comments or other attachments, the participants in the current study exclusively employed text comments. Altogether, there were N=14 digital boards with 134 text comments, 37 author's responses and 4 replies to author's responses. Recorded feedback comprised 27 files (16 audio- and 11 screencasts, with one including a talking-head for the first ten seconds) and 2 author's responses (as audiocasts). In the forums, 62 text comments were created, 1 announcement was made by a presenter, and 9 author's responses were provided. The level of asynchronous follow-up interactions was thus relatively low (see also section 4.10.5), given that synchronous discussions were enabled in the subsequent synchronous meetings.

Looking closer, we observe that each feedback method and **tool** had distinct **features** and thus different affordances and limitations. Regarding the digital boards, several settings were possible when creating a Padlet (or Jamboard). Most authors chose a fixed structure (11 Padlets) of which N=6 were in table format, N=4 in reverse chronological order as well as N=1 in another type of fixed structure. On the other hand, N=4 Padlets had a flexible structure, which means that their posts could be moved either freely (3 Padlets) or at least to a limited extent (1 Padlet). Moreover, N=12 digital boards allowed for adding new posts, 2 did not. In N=9 Padlets, commenting on individual posts was possible, whereas it was not in N=5 others. Instead, new posts had to be added on those boards, which potentially hindered effective cross-referencing. Furthermore, anonymous commenting seemed to have been enabled in a few cases. Finally, the authors of N=8 boards offered the possibility to like or rate a comment/post, while N=6 did not. As the qualitative analysis has shown (see section 4.7.2), each configuration appeared to have certain benefits or challenges, e.g. depending on whether students already had specific topic ideas in mind or were undecided between several broad topic areas. In that respect, a column format with different colors per topic as well as commenting within each column seemed conducive, as e.g. S012's case has shown. By contrast, flexible structures were useful for loose arrangements of brainstormed ideas that could be rearranged by the peers and interconnected through arrows or coloring (see video by Schluer, 2024k, at https://youtu.be/Z5xY_tVfkkA). Posting in reverse chronological order and fixed structures did not seem suitable for establishing connections between posts, especially if the possibility for direct commenting below individual posts was disabled.

With regard to audio- and screencasting, two students (S003 and S004) recorded their feedback in two separate files, one for the work plan and one for the table of contents. Furthermore, one screencast video (by S002) was found to be a talking-head video, but the video image appeared for only 00:10min in the introductory part. This might have resulted from their intention to try out different digital feedback methods and find suitable technologies for particular assignments and feedback contents (see survey analysis in section 4.4). A noticeable

difference to earlier research on screencast feedback (Schluer, 2021b; 2022b) was the low number of visual strategies in the present files. While students' unfamiliarity with screencast feedback could be one major reason, it is also likely that the chosen program for screen-recording had an impact. Indeed, only one student (S014) utilized a software (Screencastify) that allowed for live annotations during the recording process. Post-editing was not discernible from the data, though. Since the videos were shared on the course cloud instead of a learning management system or video platform, direct commenting on the audio- and screencasts was not possible. However, one participant replied (S003) asynchronously by producing audio responses for her peers.

Finally, the forum entries were mainly textual in nature. However, N=22 out of 62 forum entries (35.48%) were given a "thumbs up"/like. One person (S012) used a profile photo on OPAL, which was visible in her four entries. File uploads, however, were not seized by the students as a possible tool feature of the online forum.

4.10.2. Feedback Structures

All feedback comments were uploaded into MAXQDA to analyze their **structures** and elements. Most forum entries and recorded files contained a greeting and a goodbye, whereas the occurrence of these elements in the digital board comments was lower. This might have to do with the more chat-like and informal nature of commenting on digital boards, as perceived from the students' perspective. More precisely, N=80 out of 134 board comments comprised a greeting and N=82 a goodbye. By contrast, all audiocasts (N=16) and 10 out of 11 screencasts included a greeting. Also, these formulas were more elaborate than in the other two text-based feedback activities, probably due to their oral and thus more conversational nature. However, even between audio- and screencasting, we noticed some differences, as screencast feedback seemed to be more concerned with pinpointing, explaining, and correcting (see section 4.10.3 below).

For instance, in the audiocasts, N=8 students started by saying that they hoped the feedback recipient was doing well (but no one in the screencasts mentioned this). Moreover, in N=5 audiocasts, the students introduced themselves (no one did this in the screencasts). Further, in the introduction to N=5 audiocasts, the students very generally mentioned that they would attempt to clarify one or some points (N=5), whereas more detailed evaluative previews occurred in the screencasts, which mainly served as transitions between the introduction and main part (N=4 out of 5 files). With regard to the closing part, there were more similarities again. N=9 students in the audiocasts and N=8 students in the screencasts wished the feedback recipient good luck or all the best. Moreover, N=3 students in the audiocasts and N=2 in the screencasts hoped that the feedback would be helpful. Furthermore, N=4 students in the audiocasts and N=3 in the screencasts said that they were looking forward to seeing the results or reading the thesis. Additionally, in two audiocasts and one screencast, the feedback providers were thankful for the submission. However, in N=14 audiocasts but only N=2 screencasts, the

students said goodbye. On the other hand, N=5 peers in the screencasts and N=2 in the audiocasts invited the feedback recipient for further dialogue.

Turning to the forum entries, we noticed that most of them had an introduction (N=58 out of 62), a greeting by using name (N=53), a thanks (N=37) and sometimes a short preview (N=6) of the following feedback. Most also contained a goodbye or other conclusion (N=56), N=11 students hoped that the feedback would be helpful, 10 students were looking forward to reading the thesis/seeing results and 5 students shared an invitation to further dialogue.

The main part of the feedback messages was analyzed with regard to the feedback objects and contents, the presumed purpose of the feedback, the amount and type of positive and negative feedback, as well as verbal and visual strategies. Moreover, cross-references and author replies were examined whenever they existed. In the next section, the feedback contents and purposes will be focused on, with verbal and visual features being examined in the subsequent section 4.10.4.

4.10.3. Feedback Contents and Purposes

Overall, most **feedback units** were found on the digital boards (M=10.5 per person), closely followed by the recorded audio or screencast feedback (M=10.0), but the fewest in the forums (M=8.8). Considering the **feedback objects**, we noted that most comments addressed the (scope of the) topic or the research method. Especially in the first activity (digital boards), most feedback was topic-related (M=6.5 per Padlet), which is reasonable since the aim was to identify or refine a suitable topic. This was followed by feedback on the research method (M=2.93). More rarely, feedback on the purpose/significance of the study (M=0.64), the research questions (M=0.57), literature/sources (M=0.57), findings (M=0.29), language (M=0.14), participation (M=0.07), and originality (M=0.07) was given.

In the recorded feedback, comments about the research method (M=0.63 per file) and the research plan (M=0.52) predominated, which complied with the intended focus of that feedback activity. Also, feedback on the research questions (M=0.48) and other topic-specific aspects (M=0.44) was common. On average, these categories applied more to the audiocasts than to the screencasts. On the other hand, the following contents were given more emphasis in the screencasts: research goal/gap (M=0.45), table of contents (M=0.45), title/front page (M=0.27). Also, there were three categories that were exclusively addressed in the screencasts: mechanics (M=0.27), title (content) (M=0.09), and argumentation (M=0.09).

Finally, the major feedback objects of the forum entries seemed to have been a mixture of the two foregoing foci: Most feedback was topic-related (M=0.77 per entry) or about the research method (M=0.52). The same mean score as for research method was found for feedback on the assignment type, i.e. the presentation (M=0.52). Other feedback foci were addressed much less frequently: feedback on the research questions (M=0.26), literature/sources (M=0.16), research design (M=0.16), research plan (M=0.08), title (M=0.05), limitations

(M=0.03), findings/discussion (M=0.03), organization for realizing research (M=0.02), TESOL conference (M=0.02), and the progress of the thesis (M=0.02). Most of the last-mentioned feedback objects only occurred once or twice in the data.

Thus, the feedback foci partly shifted with the type of the reviewed assignment. In line with the distinct stages of the research process, also the associated **feedback purposes** varied. Most feedback on the digital boards was given with the purpose of reflection/inspiration (M=6.50), followed by motivation (M=4.79) and correction (M=0.50). The high proportion of feedback for reflection or inspiration on the digital boards resonates with the objective of finding or refining the peers' topics for their Master theses or doctoral dissertations. At a later stage, i.e. the drafting stage of the research, most feedback given in the audio- and screencasts appeared to be motivational in nature (audio: M=2.38; screencast: 2.18), closely followed by reflection/inspiration (audio: M=2.00; screencast: 2.00). However, corrective feedback occurred more often in the screencasts (M=0.55) than in the audiocasts (M=0.06). This presumably resulted from the possibility to pinpoint and correct when screencasting was applied during the review of an assignment. Additionally, in both modes, some feedback was provided for reassuring correct understanding (audio: M=0.25; screencast: M=0.18). Most feedback in the forum entries also was given with the purpose of motivation (M=1.08), followed by reflection/inspiration (M=0.98). Reassurance for correct understanding (M=0.04) was very rare, probably since students had become pretty familiar with their peers' projects throughout the course. Also, no corrective feedback was found in the forum entries.

The assignment quality and resultant purposes and contents of the comments also affected the feedback strategies that were adopted. Overall, in the board comments and forum feedback, most feedback was specific **positive feedback** (M=7.4 per forum; M=6.14 per board; M=2.09 per screencast; M=1.90 per audiocast). In the recorded feedback, more specific **negative feedback** was given in total, but the majority occurred in the screencasts. More precisely, there were M=2.09 sequences of specific negative feedback in screencasts and M=1.50 per audiocast. Hence, only screencast feedback tended towards specific negative feedback rather than specific positive feedback, which is in line with the above-mentioned inclination towards correction. On the boards and in the audiocasts, unclear tendencies (valences) of feedback were occasionally found. In the forum entries and screencasts, no unclear tendency of feedback was detected. Additionally, across all three feedback methods, no non-specific negative feedback was exchanged.

While the above findings describe general tendencies, a look at individual students might be valuable as well. Specific positive feedback was given most to S009 in N=10 sequences on the digital boards, to S001 and S012 in N=8 sequences each in recorded feedback, and to S006 in N=8 segments of forum feedback. Non-specific positive feedback was provided most to S001 in N=3 sequences on the digital boards, to S003 in N=5 sequences of recorded feedback and to S005, S007 and S011 in N=3 passages each in forum feedback.

Specific negative feedback was given most to S011 in N=17 sequences on Padlet, to S003 in N=11 sequences of recorded feedback, and to S005, S007 and S011 in N=4 segments each in forum feedback. Interestingly, S008 and S015 did not receive any negative feedback on digital boards (note: S015 only *received* feedback, he did not *give* any feedback on the boards). S008 did not obtain any specific negative feedback in the forum feedback as well. Furthermore, S007 was not given any specific positive feedback in the recorded feedback.

S001 and S004 had unclear tendencies in the feedback they received on the digital boards (1 sequence each). Additionally, S001, again, and S005 received unclear tendencies of feedback (1 sequence each) in the recorded feedback.

Another analyzed phenomenon were **(cross-)references** in the different feedback events, which eventually turned out to be diverse in nature. On the digital boards, most references were made to communication within the Padlets (M=0.71). In the audiocasts, references to own experience (M=0.63) and to prior communication (M=0.44) were established most, which did not occur in the screencasts. In the forums, most references related to communication in real life (M=0.3). Furthermore, on the digital boards and in the forums, references to (literature) sources and to communication in real life (as in the audiocasts) were included. Additionally, screencasts contained references to students' own working experience (M=0.27) and to other peers' work (M=0.09), which were not detected in the audiocasts. As in the references to other text comments on the digital boards, one reference to another forum entry was established in a forum. Moreover, in the forum entries, earlier teacher feedback was mentioned once.

4.10.4. Linguistic and Non-Verbal Features of the Feedback

All feedback methods included written or spoken language; hence, it was possible to perform **linguistic analyses** of the (transcribed) data. Notably, personal pronouns, hedges and boosters, as well as sentence types were examined. Across all three feedback methods, linguistic hedges were utilized more than boosters. There were M=22.4 hedges per forum, M=20.43 per Padlet, M=11.56 per audiocast and M=10.82 per screencast. Boosters occurred M=9.3 times per forum, M=6.13 per audiocast, M=5.36 per screencast, M=5.00 per Padlet.

Likewise, in all feedback methods, the "you" perspective was more prominent in terms of personal pronouns than the "I" perspective. However, they were used with varying frequency across all feedback methods, as Table 62 shows. Per board, M=23.64 "you"-related pronouns were used, M=20.13 per audiocast, M=19.00 per screencast, and M=7.29 per forum entry, which even amounted to almost M=45.2 "you" pronouns per forum. "I"-related pronouns occurred M=18.19 per audiocast, M=17.6 times per forum (M=2.84 times per forum entry), M=12.18 per screencast, and M=12.29 times per Padlet. Much more rarely, the inclusive "we" perspective was adopted. On average, it surfaced approximately once per digital board and forum, but in only every second audiocast (M=0.49) and every third screencast (M=0.37).

Table 62: Means of Occurrence of Personal Pronouns Across Different Digital Feedback Methods

Feedback method	"You"-related pronouns (Mean)	"I"-related pronouns (Mean)	"We"-related pronouns (Mean)
Digital Board	23.64	12.29	0.93
Audiocast	20.13	18.19	0.49
Screencast	19.00	12.18	0.37
Online Forum	45.20	17.60	0.80

In the feedback analyses, statements were assumed as the default sentence type and therefore not coded. Per digital board, M=7.64 questions were asked on average, i.e. 80% of all contributions contained one question (M=0.80 questions per board comment). Similarly, 87% of the forum entries included one question, leading to a mean of M=5.4 questions per forum. In the recorded feedback, there was an average of almost two questions per file (M=1.96), but it should be noted that the verbal feedback was generally more extensive than the written feedback. More precisely, M=2.12 questions were found in the screencasts and M=1.45 in the audiocasts.

Imperatives were used most on the digital boards (M=0.86), followed by the screencasts (M=0.82). They occurred even more rarely in the audiocasts (N=1; M=0.06) and altogether only twice in the forums (M=0.20). Exclamations and smileys/emojis were used similarly often on the digital boards and in the forums. The average was M=2.79 exclamations per board and M=2.2 exclamations per forum, as well as M=1.43 smileys/emojis per board and M=1.6 smileys/emojis per forum. On average, M=0.64 abbreviations/shortcuts were used on a digital board but none in the forum entries. These text-based visual strategies were not possible or available in the spoken modality of the recorded feedback.

On the other hand, the analysis of the recorded feedback led to two new categories in the code system, which were paralinguistic cues and linguistic fillers. Paraverbal aspects, such as giggles and laughter, appeared in 10 out of 27 files; in 4 of them they occurred together. Most giggles and laughter occurred in the audiocasts (N=24 times in total). However, the linguistic filler "erm" was counted almost equally often in both recorded feedback types (M=12.94 per audiocast, M=12.36 per screencast).

Similarly, the availability of **visual strategies** is constrained by the feedback modes and tool features. Visual strategies in the written comments (digital boards, forums) were typographical adjustments, e.g. through coloring, bolding or capitalization as well as thumbs up/likes and emojis/emoticons. On the digital boards, N=7 authors colored their initial posts, while in N=9 cases they did not. By contrast, peers commented 44 times without using a color for their posts. In 11 instances, a color was utilized, out of which N=5 colored posts came from the same student (S009). When the authors replied to the peer comments, two of them chose a color for their posts (once by S002 and 4 times by S008). Finally, the teacher used colored

posts (yellow) N=8 times. On Jamboard, this once coincided with the default color (yellow), but once it did not (green). Additionally, in two cases, typographical adjustments were applied to the text comments in the Padlets. One word (“everything”) was written in bold font and another word (“not”) was typed in capital letters. In the forum entries, N=5 typographical adjustments were found: bullet points, numbering, bold font (as on digital boards), underlining, and inserting a heading.

Due to their oral-only nature, visual strategies were absent from the audiocasts. Even though a variety of visual strategies is enabled by screencasting, only cursor actions (including live marking) were employed in the present data set. Mostly, the cursor was used for scrolling through the document (M=5.73), pointing or circling (M=1.82), moving to and/or clicking on a button (M=1.00), drawing an object (M=0.45), or marking a passage (M=0.36). For an average of M=1.73 times per file, unintentional cursor movements were observed.

Hence, we note some commonalities but also differences across the feedback methods, modes and tools in terms of their structural components and verbal as well as visual strategies.

4.10.5. Feedback Directions and Interactions

The most prevalent feedback direction was from feedback provider to feedback recipient, but occasionally additional exchanges occurred in the same asynchronous mode. In that regard, the recipients’ responses to the feedback received (i.e. the so-called **author responses**) were analyzed as well as further follow-up interactions whenever available. On the digital boards, there were N=37 author responses to the 134 text comments, which amounted to a response rate of 27.61%. In most cases, the authors gave an explanation (N=27) or thanked for the feedback (N=24). Also, N=5 questions were asked back. In N=22 responses, there was no greeting, in N=13 cases there was a greeting by using name, and in N=2 posts, there were general greetings. Usually, there was no goodbye (in 29 out of 27 responses). In the forums, only two students (S005 and S011) overall responded to the feedback. S005 replied to all forum entries he received (N=8), whereas S011 responded to only one. In every response, there was a greeting by using name and a goodbye as well as an expression of thanks (in one response even twice). Moreover, the authors provided explanations (N=6) and in N=2 cases they referred to details mentioned in their presentation. No questions were asked back.

In both digital board and forum feedback, the author responses included more linguistic hedges than boosters. In the responses on the digital boards, there were M=0.54 exclamations and M=0.16 smileys/emojis on average. In the replies to the forum entries, M=1 exclamations were made and M=0.33 smileys/emojis were utilized. The “I” perspective was used predominantly on both digital boards (M=1.84) and forums (M=9.67), followed by the “you” perspective.

In the recorded feedback, only one student (S003) responded to her given feedback by creating two audiocasts for her peers (7.41% of 27 files). Both files had similar components, i.e. greeting by using name and giving an explanation for the received feedback. However, they

differed in some details. First, S003 did not thank S004 for the *feedback* as she did in her response to S002 twice (even "very much"). Instead, she only thanked S004 for *listening*. Second, she told S004 that she would take her advice *in the future* whereas she stated that she took S002's advice *already*. Third, S003 mentioned trouble in understanding S004's voice in the audiocast as well as some technical problems with a file.

Peers' follow-up replies to the authors' responses were even rarer. Only in N=4 instances on the digital boards, there was such an asynchronous follow-up interaction. More precisely, S003 thanked the author S005 for his explanation to an open question and gave another recommendation to the author S011 after she had answered her initial questions. Here, communication could have evolved even further because S003 asked another follow-up question to the author. Besides, S014 replied to the author's (S012's) thankful response by mentioning that she had worked on this specific topic in her bachelor's thesis. Additionally, she stated interest in reading the author's thesis. Furthermore, S001 replied to a question that S014 had posed in her author's response.

Generally, the lack of asynchronous follow-up interactions resulted from the course design that enabled synchronous discussions in the subsequent live meeting (or asynchronously in the next feedback activity). These and further aspects will be considered more deeply in the discussion chapter 5. Beforehand, the results from the summative course evaluation survey will be expounded.

4.11. Results from the Summative Course Evaluation

Survey 4 was implemented at the end of the course and served as a summative evaluation of the seminar from the participants' point of view. Altogether, N=13 instead of 14 students participated in the survey, since S010 quit the seminar prior to the final stage. Moreover, S003 was not actively participating in some of the course sessions towards the end of the semester. For the open questions of the survey, she only filled in question 1 in part 3 and left the rest empty. The results will be presented in the ensuing subsections, starting with the ratings.

4.11.1. Rating Results

Part 1 of the summative evaluation survey consisted of 17 five-point Likert-scale items, addressing different aspects of the learning process, instructor, media use, organization, learning gain/satisfaction. For each statement, the students were asked to select a score from (1) "does not apply at all" to (5) "fully applies"[13].

[13] See Figure 121 for an overview of all statements. The single charts are not repeated here to avoid duplications of the information. Readers may refer to Schluer (submitted) for details.

4.11.1.1. Course Evaluation of Learning Process

With scores between M=4.08 and M=4.69, the students demonstrated high to very high agreement with all statements pertaining to the learning process. Thereof, the comprehensibility of the seminar contents received the highest mean score (M=4.69), closely followed by its clear structure (M=4.62) and the development of self-directed learning (M=4.62).

More precisely, for statement #1 ("The seminar contents are conveyed in a comprehensible manner"), N=10 participants gave a score of 5 (76.9%), two participants (S006, S007) selected a score of 4 (15.4%), and only one participant (S003) assigned a score of 3 (7.7%), resulting in M=4.69. For statement #2 ("The structure and aims of the seminar have been made clear"), a similarly high number of N=9 participants awarded a score of 5 (69.2%), three participants (S006, S009, S011) chose a 4 (23.1%), and merely one participant (S004) provided the score 3 (7.7%), i.e. M=4.62. With regard to statement #3 ("The other students show interest in this seminar"), the scores were generally lower. Only N=5 participants gave a score of 5 (38.5%), another five (S003, S006, S009, S011, S012) assigned a 4 (38.5%), two participants (S004, S007) picked a 3 (15.4%), and one participant (S005) selected a 2 only (7.7%), yielding M=4.08.

Statement #4 ("The seminar fosters cooperative learning and studying and improves students' capacity to work in a team") was second lowest in this section, with N=7 participants assigning the score 5 (53.8%), four participants (S006, S007, S011, S012) the score 4 (30.8%), and two (S003, S0014) the score 3 (15.4%), thus averaging M=4.38. Statement #5 ("The contents and methods of the seminar foster individual initiatives and self-directed learning"), in turn, received higher scores again (M=4.62), with N=9 participants selecting a 5 (69.2%), three (S005, S006, S008) a 4 (23.1%), and one (S003) a 3 (7.7%). Finally, for statement #6 ("The learning and teaching methods of the seminar foster the students' methodological competencies"), N=8 participants assigned a score of 5 (61.5%), four (S005, S006, S007, S009) a score of 4 (30.8%), and one (S003 again) a score of 3 (7.7%), i.e. M=4.54.

4.11.1.2. Course Evaluation of Instructor

The statements referring to the course instructor received the highest scores overall, with about M=4.9 for each statement. Statement #7 ("The instructor responds to the students' questions, comments and objections in a thorough manner") received the highest score 5 from N=11 participants (84.6%) and the second-highest score 4 (15.4%) from the two remaining participants (S008, S011). This equals M=4.85. Likewise, N=11 participants provided the score 5 (84.6%) for statement #8 ("The instructor is friendly and open-minded towards the students") and two participants (S003, S011) picked the score 4 (15.4%), yielding M=4.85 again. Within this section and even in the entire questionnaire, the highest scores were obtained for statement #9 ("The instructor is usually well-prepared"), with M=4.92. More precisely, N=12 participants awarded a score of 5 (92.3%) and only one participant (S008) selected a 4 (7.7%).

4.11.1.3. Course Evaluation of Media Use

The mean ratings for the survey section on media use were high as well, with M=4.54 and M=4.62, respectively. To give exact numbers, N=8 participants provided a score of 5 (61.5%) and five participants (S003, S007, S009, S011, S012) a score of 4 (38.5%) for statement #10 ("The media used (slides, apps, e-learning platform etc.) are helpful"; M=4.62). Since this course introduced and utilized a variety of media, such an evaluation supports their intended usefulness. Furthermore, statement #11 ("I am satisfied with the equipment of the (digital) room") received high scores as well (M=4.54), with N=8 participants choosing a 5 (61.5%), four (S006, S007, S009, S011) a score of 4 (30.8%), and only one (S003) the score 1 (7.7%). When disregarding this extreme case, we would have obtained an even higher overall score of M=4.67.

4.11.1.4. Course Evaluation of Organizational Aspects

This section contained an item that was originally created as a test for ensuring students' close reading of the statements. In previous years, the number of participants in the research colloquium was relatively low, especially when compared to the larger seminars that students usually attend. Hence, statement #12 ("The number of participants in this seminar is too high") initially served as a check to see whether respondents consistently positioned their ratings towards one end of the rating scale for all items, or whether they read each statement closely. However, in the current implementation, the number of participants was higher than before. In peak times, up to N=22 students took part in the single sessions, which stood in stark contrast to maximally N=10 in previous years. Thus, even the number of 12 to 14 persons who regularly contributed to the feedback activities in the current TRC was comparatively high. Consequently, participants might have desired a more profound discussion of their individual research projects. This could have been one of the reasons why several persons provided a relatively high score to statement #12, leading to a mean of M=2.46. Nevertheless, this was the item that received the lowest overall rating in the survey. In light of the above-mentioned factors, it is understandable that this item received mixed results. More precisely, N=2 participants (S001, S011) gave a score of 5 (15.4%), one participant (S013) the score 4 (7.7 %), three participants (S003, S006, S007) a 3 (23.1%), two participants (S008, S009) a 2 (15.4%), and five participants (S002, S004, S005, S012, S014) a score of 1 (38.5%). With about half of the participants selecting a low score, this result presumably indicates that the participants had read the question carefully, while others probably truly perceived the seminar as too crowded or suitable in size.

Concerning the size of the (digital) room, most students agreed that it was fitting (M=4.54). For this statement #13 ("The (digital) room is adequate in relation to the number of participants"), N=8 participants provided a score of 5 (61.5%), four participants (S007, S009, S011, S013) a 4 (30.8%), and one participant (S003) a 3 (7.7%). Lastly, with regard to the seminar requirements addressed by statement #14 ("The requirements of this seminar are adequate"), N=9 participants assigned the score 5 (69.2%), three participants (S003, S006, S014)

chose a 4 (23.1%), and one participant (S009) a score of 3 (7.7%), resulting in M=4.62. Hence, despite the high workload, the majority of respondents seemed satisfied with it, which is also mirrored in the results to the final survey section that will be synthesized next.

4.11.1.5. Course Evaluation of Learning Gain/ Satisfaction

Students generally expressed high satisfaction with the seminar (M=4.77 for statement #15: "In general, I am satisfied with this seminar"). To give exact numbers, N=10 participants awarded the score 5 (76.9%) and three participants (S003, S006, S012) picked a 4 (23.1%).

The perceived learning gain, however, differed, which might have to do with the heterogeneous background knowledge and expectations of the participants and maybe also with the quality of the feedback they had received. Still, the score was pretty high with M=4.38 for statement #16 ("I learn a lot in this seminar"). There, N=7 participants chose the score 5 (53.8%), four participants (S005, S006, S007, S014) the score 4 (30.8%), and two participants (S003, S011) the score 3 (15.4%). Finally, for statement #17 ("The seminar is inspiring"), again the majority assigned the highest score 5 (53.8%), while the remaining six participants (S003, S005, S006, S007, S011, S012) gave the second-highest score 4 (46.2%), yielding M=4.54.

In sum, the rating results were very favorable and might be indicative of a well-designed course. More detailed insights were collected through the open responses shown below.

4.11.2. Open Responses to the General Course Evaluation

Part 2 of the course evaluation survey started with two questions, i.e. "What did you like most about this seminar?", and "What could be improved in this seminar?". The results are summarized in Table 63 and will be elaborated further in the following subsections.

Table 63: Summary of Open Responses from the Course Evaluation Survey

Aspects that were liked most	Aspects that could be improved
Exchange with other students	High workload (of feedback)
Positive class atmosphere	Unclear course objectives
Providing/ receiving feedback	More information about research methods and the analysis of empirical data
Learning/ using different digital fb. methods	Unwillingness to engage in peer feedback
Well-organized content	Varying (low) quality of peer feedback
Course strategy/ design	Trying new digital feedback methods
Helpful for thesis writing	Offering more individual consultations
Instructor	Conducting more face-to-face sessions
Online learning	
Efficient use of time	
Recording of presentation	

4.11.2.1. Positive Aspects

Out of the N=13 respondents, twelve (i.e. everyone except for S003) described their favorite aspects of the research colloquium. Four participants (S004, S005, S011, S014) mentioned that they enjoyed the opportunity to **exchange and share information about each other's theses with their peers**. For example, S014 wrote that she liked "[t]he exchange with the other students, listening to their topic presentations". Such information exchange and sharing created **a positive class atmosphere** (S013) and made students feel less afraid of receiving negative feedback (cf. S005): "[…] the positive environment of each seminar was very helpful to keep going, and listening to other, more experienced participants' projects was also very helpful to me" (S013).

In the seminar, several assignments were implemented on which the participants were asked to provide feedback digitally to their peers. Three respondents (S005, S007, S011) mentioned that they liked **giving or receiving feedback** in this seminar. S005 specifically noted that providing feedback, rather than grading, can "keep motivation to work very high". Many participants (S001, S002, S007, S009) also enjoyed **learning and using different digital feedback methods**. For example, S007 believed that these modern feedback methods make the seminar more appealing: "[…] the different feedback methods were used in this seminar and these methods are highly contemporary, which made the seminar more interesting".

Regarding the course contents, S008 and S011 mentioned that the colloquium was **well-prepared and organized**: "In my opinion, the course in general was very connected and organized" (S008); "Overall, the course was well-prepared and structured" (S011). S008 also commented that the course adopted **suitable teaching strategies**: "I think the course strategies were perfect". In addition, S009 stated that **the instructor** was "cooperative".

This seminar was designed for students who were preparing to write their graduation thesis in the TESOL discipline. Indeed, the participants considered the course very **helpful for their thesis writing** (S008, S012). S012 elaborated as follows:

> "I really liked that I got so in touch with my topic and that others encouraged my choice of topic. The seminar provided a step-by-step manual to find a topic, research it further, and form the thesis plan. Preparing the presentation was especially helpful in refining my topic and thesis plan. Preparing the presentation and verbally expressing my thoughts required a good understanding of the literature and my research plans. Thus, the intensive preparation for the presentation helped me immensely in my thesis journey" (S012).

This seminar adopted **a hybrid approach of online and offline methods**, which was more convenient for some students than in-person meetings: "Online meetings were really easy to attend, easy to share information between the students and the teacher and between the students themselves" (S002). S004 also noted that **class time had been utilized effectively**.

In assignments 6 and 7 of this seminar, the students were required to **record presentations** about their thesis as video files, upload them to the learning platform, and give feedback

to their peers through the forum. This experience was novel and helpful for S008: "Recording the thesis topic presentation was a very different idea for me because, usually we present our presentations in person or even online but it was a very interesting experience watching our presentations and giving helpful feedbacks [sic] to each other" (S008).

4.11.2.2. Suggested Improvements

Next, N=11 respondents gave suggestions for improving the course further (S003 and S006 did not answer this question). Unlike the participants who liked using a variety of different digital feedback methods, S012 and S014 remarked that **providing digital feedback** so many times in one seminar **can create an excessive workload**: "I personally did find the feedback workload relatively high" (S014[14]). S012 explained that receiving and responding to peer feedback at every step of the thesis writing process, as well as reviewing peers' projects and giving feedback, prevented her from spending more time on her own thesis project:

> "I am well aware that the seminar revolved around different kinds of feedback methods. However, sometimes I felt overwhelmed by the abundance of feedback (feedback after every step). The provision of feedback required a lot of time as one had to read/ listen to the peer's contributions carefully and then provide the feedback in different ways. Though reviewing my peers' work was sometimes highly insightful, some of the time I would rather spend on my own project than on other peers' projects (due to cramped life schedule)" (S012).

In addition, three participants also expressed **dissatisfaction with the quality of some feedback they received from their peers** (S001, S005, S012). S005 believed that some peers did not provide feedback voluntarily, but rather did so just to fulfill the requirement, resulting in comments that was short and lacked useful content: "Time should not be spent on students who do not engage and are not willing to participate" (S005). This also explains his low rating for statement #3, "The other students show interest in this seminar", where he only assigned the score 2 and thus expressed his disagreement (see section 4.11.1.1). S012 similarly mentioned that the quality of the peer feedback she received varied. She obtained useful and insightful feedback from some participants, but low-quality feedback and comments from others:

> "[…] the quality of the feedback one receives is likely very dependent on one's group. For instance, my peer group had [S001] and [S005], who are both very knowledgeable, talkative, excellent English speakers, and like sharing their ideas and thoughts. Also, [S001] is one academic step further, which made her input even more helpful and exciting as she already went through the stages of an MA thesis. However, having other group members, the quality of feedback might decrease" (S012).

[14] It should be noted that S014 participated in the seminar, but based on the feedback she received for the first assignment, she discarded her topic and did not submit any further files about it. Maybe the imbalance in providing feedback vs. no longer receiving feedback contributed to this impression.

Another suggestion regarding feedback was raised by S007. She hoped to be able to **try different feedback methods** in future TESOL Research Colloquia to avoid repetition, making it more attractive to students who attend this seminar again.

In S009's view, **the course objectives were not entirely clear**. S004 also pointed out that although the objectives included an introduction to research design, research strategies and data analysis, these topics were not actually discussed:

> "Some of the course objectives were related to describing research methods and analysing empirical data. We did not have time to discuss them in our sessions. It would be great if we actually had a separate course on research methods in ELT. I think it is a foundational skill that every novice researcher must know. I sometimes lose my sense of direction while trying to self-teach myself eveything [sic] from scratch" (S004).

In addition, although some participants mentioned earlier that they enjoyed the online conferences, a few desired **more in-person sessions** (S013). S011 also suggested that the instructor could **provide more individual thesis consultations**.

4.11.3. Summative Evaluation of Digital Feedback

In this final part of the survey, the students were first asked to state and explain which types of feedback they considered most useful in the seminar. All thirteen participants answered this question, with two of them (S007, S014) commenting on two feedback formats, so we received a total of 15 responses for the statistics shown in Figure 120.

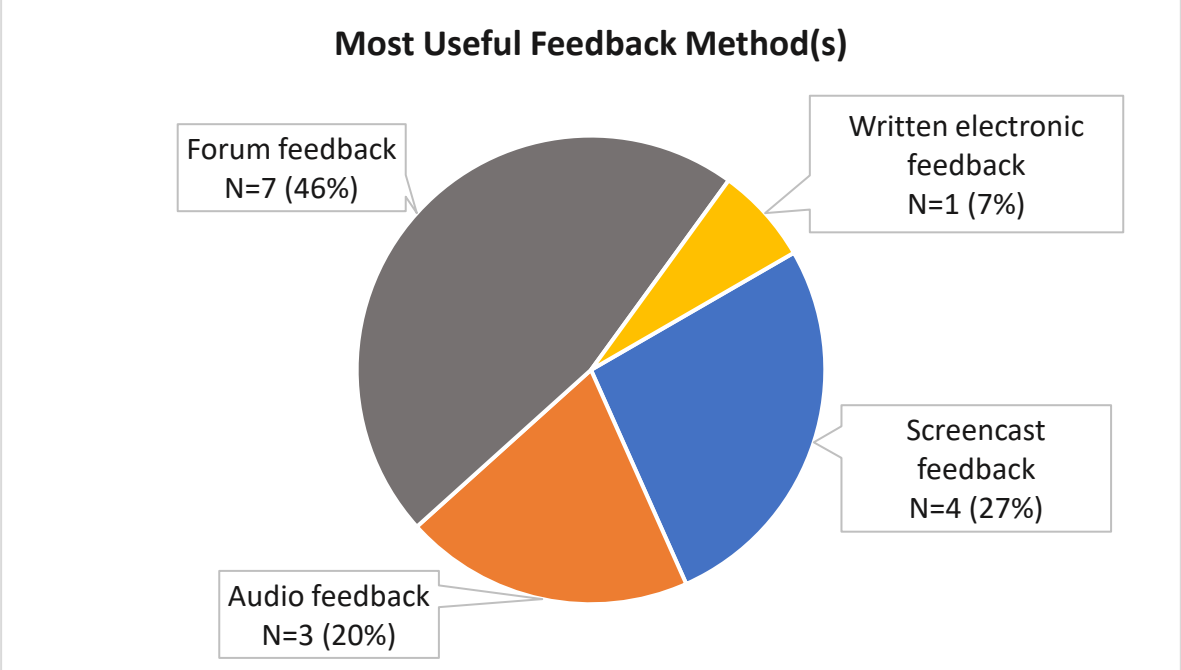


Figure 120: Summative Evaluation of Usefulness (Number of Mentions)

Seven participants (S005, S006, S007, S008, S011, S012, S014), i.e. almost half of all respondents, considered **forum feedback** to be the most useful. From the perspective of the feedback providers, the participants found that forum feedback was easy to provide (S012, S014), less time consuming (S012, S014) and easy to structure (S012). It helped shy students express their views and provide their opinions: "People tend to shy away from giving live feedback. The use of forums and asynchronus [sic] feedback provides shy people with the perfect platform to present their ideas and give feedback on other people's feedback" (S005). From the viewpoint of the recipients, forum feedback was easy to re-read and easy to work on (S012): "I also like that I can copy aspects out of the feedback into my working paper (this way I do not have to switch between different pages)" (S012).

Four participants found **screencast feedback** (S002, S003, S004, S014) to be the most useful. Since only seven students received feedback via screencasts in the TRC, this corresponds to the majority of recipients (57.14%) (see section 4.8.1). Three of them (S002, S003, S004) liked it because it aided in locating where the feedback provider was referring to. This was beneficial from the perspectives of both providers and recipients: "[…] you can get connection more [sic] when the feedback producer is pointing" (S003); "I could easily navigate to the section where the feedback is relevant. It made my feedback more concrete" (S004). S014 also noted that screencast feedback combined verbal and visual channels, which offered the possibility of providing feedback on more complex contents.

Three participants assessed **audio feedback** as most useful (S001, S009, S013). Since N=11 students obtained feedback via audio, this only represents a quarter of all respondents (27.27%). For example, S001 liked the convenience and ease of audio feedback. Similarly, S013 lauded its ease of access: "you can play the recording as many times as you wish and whenever you want". Moreover, S013 believed that hearing the feedback provider's voice would reduce misunderstandings: "when you hear the speaker's voice, intonation, and inflection it reduces misinterpretations".

Given that more respondents received audio feedback than screencast feedback in the recorded feedback task, the higher overall score for screencast feedback might be indicative of its higher usefulness compared to audio feedback. More generally, in these evaluations, this varying number of persons receiving or producing feedback in the different modalities needs to be considered, with all of them engaging in feedback processes on digital boards, most of them in the online forums, several in audio feedback but only a few in screencast feedback.

S007 additionally noted down **written electronic feedback**, but did not specify what this exactly referred to. It could very likely relate to the written feedback provided by the instructor in text editors, but might also be a cover term for both forum and board feedback or possibly also written feedback in the videoconferences.

However, nobody explicitly mentioned feedback on digital boards or other cloud-based editing applications in this survey section, even though it received favorable evaluations in

survey 1 (see its analysis in section 4.3.3). This omission may be due to the fact that feedback on digital boards was used the earliest so that participants' impressions of it were blurred.

Next, when students were asked about what they would do differently in the future, the following responses were obtained. First and foremost, several participants offered suggestions for the utilization of **screencast feedback**. S004 proposed that adequate preparation, such as writing notes, ought to be done before the recording:

> "If I have time, I would like to prepare my feedback in advance before starting the screencast audio. Feedback with a medium of speech is not organised. Before finalising the feedback, I tried a couple of times. Therefore, it is better to prepare a written summary of the feedback in advance."

S011 stated that she tried to find some video recording software, but unfortunately, most of them were not free[15]. Furthermore, S002 commented that she would like to use screencast feedback more in the future.

S001 gave suggestions for improving the provision of **audio feedback**: "I will add music in the beginning. As a receiver, I will ask my peers to clarify their aims of the audio feedback in the first place so that I can easily follow."

In contrast to the above-cited majority view that **forum feedback** was liked most, S013 found it least useful. However, it seems that it is not forums as a form of feedback that she disliked, but that it was the process of recording presentations, watching them offline, and providing feedback prior to the synchronous meeting. Rather, she preferred listening to peer presentations and providing feedback in a live face-to-face session:

> "I found the least helpful peer-written feedback on our presentations. Maybe it would be better if we had face-to-face discussions where we could elaborate on our comments or ask others to do so on their comments. I am not saying that we didn't have any chance to ask each other questions in the BBB classroom but it would be even more helpful in the real classroom, I think" (S013).

Accordingly, she also desired more face-to-face discussions in person.

Apart from their suggestions for the utilization of specific digital feedback methods, several students also gave more general recommendations for optimizing the course design and feedback processes. To avoid superficial feedback, S005 and S012 mentioned that instructors could provide some **guiding questions** to help peer feedback become more in-depth: "There should be some sort of guidlines [sic] that encourage people to only give useful feedback rather than feeback [sic] for the sake of feedback" (S005). Such considerations also seem to be related to S011's comment who thought about structuring the feedback in a more straightforward manner: "To give feedback more concisely by categorizing them under the headings in detail.

[15] A manual and list of different (free) software programs was handed out to the participants, though.

Maybe next time I can share my comments in tabular form while giving feedback. Maybe more effective." This might also reduce the time investment on the students' side.

Two respondents (S006, S008) also took a wider outlook by contemplating on the use of digital feedback in school scenarios: "I think at school will be an interesting experience" (S008). This may point to their interest in using digital feedback in their future teaching career.

Finally, the participants were asked about other types of digital feedback they would like to try out in the future (and in what contexts). Depending on the students' prior experience, the responses varied, but most of them showed interest in screencast feedback:

> "As a producer, I will use screencast feedback because I found it is more challenging and helpful to improve my speaking skills. As a receiver, peers can ask what types of digital feedback they prefer." (S001)
>
> "I would like to try peer screencast feedback when I teach a writing course at university." (S004)
>
> "Probably, I would practice more screencast feedback because to me this is the best way of giving digital feedback as it includes audio and visual elements and is beneficial for both types of learners." (S013)

The remaining responses ranged from e-portfolio feedback to forum and survey feedback as well as live feedback in small groups:

> "I would use e-portfolio feedback method at university because you can save all the feedback in the same place and benefit from the feedback." (S002)
>
> "Forum feedback can be beneficial in learning enviroments [sic] as well as in the workplace." (S007)
>
> "Survey in the workplace or at the university." (S011)
>
> "Small group live feedback. Perhaps in in-person private group meetings." (S005; cf. S013)

While these open questions were newly introduced in the course evaluation survey in winter term 2022/23, all preceding questions, notably the ratings, had already been part of the summative surveys in previous years. It is therefore possible to compare the results across years, as will be done in the following section (and in a more detailed manner in Schluer, submitted).

4.12. Comparison with Course Evaluation Results from Previous Years

The design of the research colloquium has evolved over several years, and course evaluations had been conducted regularly. In her paper, Schluer (submitted) described the development over three years, starting with its first implementation in 2020, its redesign as part of the

DigiFeed project in 2021/22[16] and the 2022/23 implementation of the present study. In 2020, students were only required to record their thesis presentation and provide peer feedback on it. In 2021/22, peer feedback processes were piloted at different stages of the research planning process, similar to the current 2022/23 implementation. However, asynchronous feedback in online forums had not yet been utilized for the third round of peer feedback. Instead, the students inserted their comments into the text pad of the videoconference application at the beginning of the live meeting (see Schluer, submitted, for details).

As illustrated by Figure 121, the comparative analysis of the course evaluation survey revealed a general upward trend for most categories, indicating improvement in seminar delivery and student satisfaction. Across all years, instructor-related categories consistently received the highest ratings (items #7, #8, #9). Furthermore, there was only minimal variation for item #1, pointing to stable content comprehensibility. Most other areas showed a steady improvement as intended. In particular, this applied to cooperative (item #4; $p<0.05$) as well as self-directed learning (item #5; $p<0.05$), for which significant differences were observed between the old and the revised course design. Moreover, a continuous and statistically significant increase was found for fostering students' methodological competencies (item #6; $p<0.05$). Even more so, there was a highly significant leap for item #17, i.e. the seminar's inspirational nature, since the introduction of the revised course design in 2021/22 (highly significant with $p<0.001$ when comparing 2020 and 2022/23). Likewise, the difference in students' perceived learning gain (item #16) was highly significant, starting with $M=2.90$ in 2020 and increasing to $M=4.29$ in 2021/22 and $M=4.38$ in 2022/23 ($p<0.001$). This resonates with the pedagogical intentions of iterative improvements in course design for the sake of students' learning.

The incorporation of digital (peer) feedback along the various phases of the research planning process thus appeared to make a significant difference as compared to the old pedagogical design from 2020. However, on the affective layer, there is still some room for improvement since the perception of fellow students' interest in the course (item #3) was not yet assessed as "very high" but "high" ($M=4.00$). The equipment of the (digital) room (item #11) is another area for discussion since students' evaluations varied over the years. It appeared that the respondents were highly satisfied in 2020 because a flexible and feasible solution was found during the time of the Covid-19 pandemic. Next, in the subsequent year, students' expectations regarding digital courses might have increased due to their heightened familiarity with digital learning and teaching. On the other hand, the change in the course management platform and the increased variety of tools (including external tools) could have caused the drop in the mean score in 2021/22 before it reached an improved evaluation again in 2022/23.

[16] Full project title: "DigiFeed - Digital feedback to help you move forward in your academic career"; Digital Fellowship funded by the *Sächsisches Staatsministerium für Wissenschaft, Kultur und Tourismus* (Saxon State Ministry for Research, Culture and Tourism); project duration: 07/2021-12/2022.

Finally, it should be noted that item #12 addressing the (high) number of participants was originally conceived of as a question for testing the respondents' attention (see section 4.11.1.4), as student numbers had generally been low in previous years (about 10 persons). In the TRC implementation, however, the number was extraordinarily high with around N=14 regular participants plus N=8 additional attendees. Hence, the heightened (and statistically significant) score for that item might indeed point to a potential problem of overcrowding should the participant number increase further. Therefore, in future colloquia, it might be beneficial to limit the number of participants or find ways to manage larger groups more effectively (see section 5.7.3 for suggestions).

Disregarding the test item #12, we thus observe an overall improvement, with a mean score of M=4.10 in 2020 to M=4.36 in 2021/22 and M=4.60 in 2022/23, i.e. in the current implementation (see Schluer, submitted).

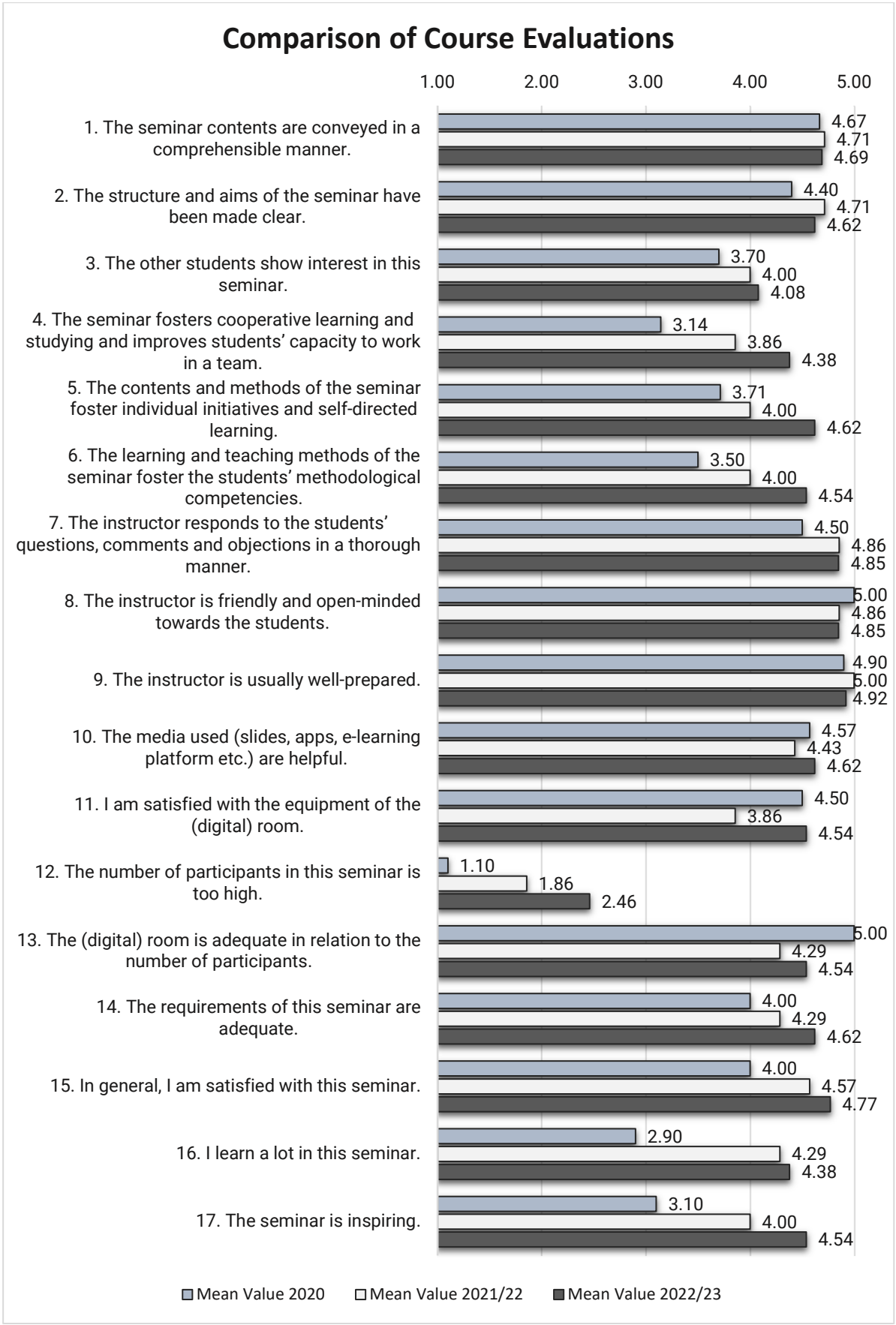


Figure 121: Comparative Course Evaluation in 2020, 2021/22 and 2022/23

5. Discussion

Following the detailed presentation of findings from both the survey and the feedback analyses, this section will start by summarizing the key results in response to the four major research questions that were posed at the outset (section 5.1). Moreover, a joint consideration and comparison of the findings from the different digital feedback methods will be performed in section 5.2. Even though prior research in this field is scarce, it will nevertheless be attempted to identify similarities and differences to previous related work in section 5.3. Due to the exploratory nature of the study, the present study entails several limitations that are to be addressed in future implementations. Sections 5.4 and 5.5 will therefore discuss the limitations and planned modifications of the research design. Additionally, suggestions for future research as well as for teacher education and professional development will be advanced in sections 5.6 to 5.8. They range from changes in pedagogical design, student training and the incorporation of other digital feedback methods (including artificial intelligence), as well as additional data collection instruments and participatory approaches in research, teaching and continuous professional development. Some of these suggestions have already been integrated into follow-up work, whereas others represent avenues for further research and teacher training, not only in the field of TESOL but also in other disciplines.

5.1. Response to Research Questions

The goal of this study was to examine in how far digital feedback methods can support (peer) learning at the different stages of the research (planning) process. More specifically, the research questions were as follows:

(1) How do students exchange and evaluate digital peer feedback via cloud-editors (on digital boards) during the phase of topic identification and delimitation for their thesis?
(2) How do students exchange and evaluate digitally recorded peer feedback (via audio, video, or screencast files) during the phase of research planning and drafting?
(3) How do students exchange and evaluate digital peer feedback in online forums during the phase of their research proposal presentation?
(4) Overall, how do students assess their learning gain from the research colloquium?

While the “exchange” aspects were mainly investigated through qualitative analyses of the peer feedback in the different media and modes, the “evaluation” dimension was elicited via three formative surveys following each peer review phase (RQ1 to RQ3). For each digital feedback phase, the results will be structured according to the following analytical categories: students’ prior experience, tool options and data characteristics, feedback directions and interactions, feedback structures, feedback contents and purposes, linguistic and non-verbal features of the feedback, students’ evaluation of tool suitability for feedback purposes, students’ evaluation of

peer feedback quality and interactions, points of convergence and divergence in the data sources (surveys and feedback analyses), conclusions and implications.

Additionally, the summative course evaluation survey was meant to complement the results, notably in terms of the self-assessed learning gain (RQ4). The findings in response to each research question will be summarized in the next sections, before a data triangulation will be conducted to reach a wider outlook.

5.1.1. Response to RQ1: Peer Feedback on Digital Boards

This section synthesizes the results from the feedback and survey analyses with regard to how students exchanged and evaluated digital peer feedback via digital boards — in this case mostly on Padlet — for the identification and delimitation of their thesis topics.

Prior Experience: In survey 1, all participants reported prior experience with cloud applications, with the wide majority (N=11) rating their familiarity as intermediate or higher. Although the initial survey questions addressed general familiarity rather than specific experience with these tools for feedback purposes, this experiential background might have contributed to a more receptive attitude towards using digital boards for peer feedback in the seminar.

Tool Options and Data Characteristics: The digital board analyses revealed that most students opted for a fixed Padlet structure (e.g., a table format) over one with a flexible structure (where the posts could be moved around). Usually, they also enabled certain tool features such as the option to like or rate posts. In most Padlets, the students as well as their peers decided to keep the default color of their posts/comments (usually, it was yellow). Furthermore, virtually all of their comments were text-based, with minimal use of multimedia elements or hyperlinks, which were mostly inserted by doctoral students (if at all).

Feedback Directions and Interactions: Overall, higher-level peers (doctoral to Master) provided feedback the most, followed by comments by same-level peers (Master), comments by the teacher and comments by same-level peers (doctoral) and lower-level peers (Master to doctoral or postdoctoral). Additionally, some feedback comments were anonymous (which was partly caused by the board settings). Notably, all feedback comments were directed solely to the board author, with little evidence of reciprocal interaction among the feedback providers. However, there are quite a few cases of indirect communication in form of references to communication within and outside of Padlet (in real life) as well as references to their own experience or knowledge and literature sources. Moreover, there were several follow-up reactions by the feedback recipients (or feedback on the feedback received), but often the feedback providers did not reply to the authors' responses again.

Feedback Structures: Structural analyses indicated that nearly all feedback comments began with a greeting (usually by using the peer's name) and ended with a farewell. Interestingly, the board with the highest volume of comments also contained most posts without greetings, possibly hinting at more fast-paced and informal communication.

Feedback Contents and Purposes: The feedback spanned various content areas and assessment dimensions, including mostly topic-related aspects and research methods, but also the study purpose and significance, literature/source use, findings, participation, language, and originality. Three primary feedback purposes emerged: reflection/inspiration, motivation, and correction — with reflection/inspiration being the most prevalent. Further, the feedback was categorized as either positive or negative, and specific or non-specific. Both specific and non-specific positive feedback were provided nearly twice as often as negative feedback. No non-specific negative feedback was given, but occasionally the feedback had an unclear tendency as to whether it should be interpreted as positive or negative.

Linguistic and Non-Verbal Features of the Feedback: Linguistic analyses revealed that the providers mostly used the pronoun "you", whereas the authors' responses mainly included "I". Moreover, the pronoun usage differed by feedback type: "I" phrases (I, me, my) were more common in specific positive feedback (M=1.43 occurrences per feedback sequence), whereas "you" words (you, your*) appeared almost equally in both positive and negative feedback (M=0.60). Furthermore, "you" pronouns were used almost 2.8 times more than "I" pronouns in feedback serving the purpose of reflection/inspiration, while their distribution was more balanced for the purposes of motivation and correction. Hedges (e.g., "may", "assume") occurred almost equally often in specific positive as well as specific negative feedback and were generally used 4.1 times more frequently than boosters (e.g., "really", "very"). Some feedback providers enhanced their textual comments using smileys or other emojis as well as typographical adjustments, with few words being written in bold font or in capital letters. Also, abbreviations or shortcuts (e.g. "u" instead of "you") were sometimes utilized, indicating familiarity with the topic or seeking informal relationship-building with their peers, respectively. However, despite these stylistic choices, the overall level of additional peer interactions remained low, with only isolated instances of indirect communication (e.g. N=3 references to board-external dialogues).

Evaluation of Digital Boards for Feedback Purposes: In survey 1, almost all respondents evaluated the utilization of digital boards (i.e. mainly Padlet) positively, with only a few adducing some drawbacks. The most frequently cited benefits of Padlet were its user-friendliness (N=9, 64.3%) and its visualization or formatting options (N=8). In addition, Padlet's interactivity (N=5) made it suitable for providing feedback from the participants' point of view. Notably, the comment function allowed for feedback on particular posts (N=4), but inhibited local feedback on specific sentences and words as compared to cloud-editing applications (e.g. Google Docs; N=1). Since editing was not primary at this first phase of brainstorming and idea exploration, the utilization of digital boards appeared to be very suitable at this stage. Also, some users appreciated the possibility to contribute comments anonymously, which might have encouraged shy students to participate as well (N=2). However, the interactivity was restricted by the very nature of digital boards, which are positioned in-between synchronous and asynchronous participation (S004). Moreover, N=4 respondents reported formatting problems (S001, S003,

S007, S012), which in many cases were caused by students' unfamiliarity with the scope of Padlet settings and features. Hence, a tool training would be crucial to help students seize the range of functions in an appropriate manner and facilitate interactive feedback exchanges on digital boards. The same applies to feedback training, as the following findings elucidate.

Evaluation of Peer Feedback Quality and Interactions: Regarding the quality of the feedback received, most students were satisfied (N=4) or even highly satisfied (N=7), whereas four students criticized it as impersonal, overly general, and not specific enough. These shortcomings appear to stem less from the medium but more from differences in feedback skills and levels of content familiarity among the peers. Since the feedback was given by students in response to other students' thesis ideas, it is obvious that students had differing levels of knowledge of these topics. For example, the feedback provided by peers with primarily Master-level expertise to more advanced (doctoral) students sometimes lacked the depth needed for constructive critique (S001). Additionally, some students were uncertain about the possible focus of their research, which thus made it challenging for the peers to offer specific and detailed commentary to them.

Points of Convergence and Divergence in the Data Sources: Both the survey and the Padlet analyses indicated students' overall satisfaction with using digital boards for peer feedback purposes. In terms of feedback characteristics, both sources hint at a prevalence of favorable comments, which, on the other hand, evoked concerns about the depth and specificity of the critiques among the recipients. Moreover, the analysis revealed that feedback was predominantly directed to the board author, with little reciprocal or dialogic interaction among peers. Thus, although the survey participants appreciated the interactive features enabled by the use of Padlet, the actual feedback exchanges remained largely one-directional. This discrepancy suggests that the tool itself seems suitable for multiple and multi-sourced feedback exchanges, but users might not be able to fully seize its features or be motivated to engage in iterative peer dialogue on digital boards. These combined findings from the two data sources underscore the value of a mixed-methods approach in feedback research. While the survey provided a broad overview of student satisfaction and the perceived utility of cloud applications, the analysis of the Padlet artifacts offered a granular look at the actual practices and feedback features. However, a simple search for correlations between the usefulness ratings in the surveys (e.g. "highly useful", "slightly useful") and the feedback analyses (notably the number of comments received, feedback strategies and the purpose of the feedback) did not lead to any conclusive results. Rather, the open responses in the survey were more revealing and provided complementary insights into the feedback analysis. This integrative consideration highlights the need for training in strategies to foster more interactive, dialogic feedback processes and to enhance students' tool-specific technological proficiency, as it stands in contrast to their relatively high self-assessed familiarity with the usage of cloud tools.

Conclusions and Implications: Generally, the advantages as well as students' satisfaction seemed to outweigh concerning the utilization of digital boards and the usefulness of the peer feedback at the stage of topic identification and delimitation. The perceived limitations might be overcome by raising more awareness of the tool functions, providing guidance in the feedback process, pairing up students with similar interests or complementary levels of expertise, and offering more opportunities for practical application and interactive follow-up.

5.1.2. Response to RQ2: Digitally Recorded Audio or Screencast Feedback

This section synthesizes the findings from the survey and feedback analyses for digitally recorded peer feedback — here mainly encompassing audio and screencast formats — during the methodological planning and drafting phase.

Prior Experience: Before attending the colloquium, the participants had limited prior exposure to digitally recorded feedback. Most had either never used or only occasionally engaged with recorded feedback methods. Among the different modalities, audio feedback was the most familiar, though still infrequently used, whereas screencast and talking-head video feedback were largely unfamiliar, especially in terms of active production rather than reception. Most students thus entered the seminar with little to no prior experience, particularly regarding more complex formats like screencast or talking-head video feedback. Notably, S002 and S004 had never used or received any form of digitally recorded feedback before the seminar, while S008 and S013 indicated at least some experience with all recorded feedback types.

Tool Options and Data Characteristics: During this phase of the research planning process, N=16 audio and N=11 screencast files were created. Thereof, one screencast video included a talking-head video, but the video image appeared for only 00:10min in the introductory part. Two students (S003 and S004) produced two separate recordings each for their peers, one for the first document (work plan) and one for the second file (table of contents). To compare their recordings with the others, their length and codings were added up to 23 files in total. Despite this aggregation, the files showed notable variation in length. The average file duration was approximately 2 minutes and 40 seconds (SD=01:32min), but several files (N=6 audiocasts and N=2 screencasts) were classified as extreme cases (as they were shorter than one minute or longer than four minutes).

Feedback Directions and Interactions: Recorded feedback, in both audio and screencast modes, generally manifested as a one-directional communication flow. While some appreciated the personal tone (e.g. by comparing audio feedback to voice messages in chat applications), the mode did not promote iterative dialogue. Only one person (S003) provided follow-up responses to the feedback received from S002 and S004. In contrast to exchanges on digital boards, the degree of interactivity and reciprocal commentary thus appeared lower. It should be noted, though, that students teamed up in small groups to exchange recorded feedback with typically two peers, which stands in contrast to the many-to-many feedback of the foregoing

(digital boards) and subsequent (online forums) phases. Hence, students possibly engaged in team-internal live discussions rather than in asynchronous follow-up communication.

Feedback Structures: Structurally, the recordings exhibited conventional elements such as introductory greetings, main body contents, and concluding wishes. Sometimes, a preview or summary of key points was added. The two feedback replies likewise exhibited similar components and only differed in some minor details. First, in her response to S004, S003 did not thank her for the *feedback* as she did in her response to S002 twice (even "very much"), but only thanked S004 for *listening*. Second, she stated that she would take S004's advice *in the future* whereas she claimed to have taken S002's advice *already*.

Feedback Contents and Purposes: Overall, negative and positive feedback were provided almost equally often. However, some positive feedback was non-specific, whereas no non-specific negative feedback was given. Furthermore, there were two sequences of unclear tendency, i.e. the valence of feedback was hard to determine. In the main body of the feedback, most comments were about the content of the work plans or table of contents but addressed aspects of language or form only rarely (4 instances). New subcategories emerged in the introductory parts, including statements such as "hoping feedback recipient is doing well", "glad to provide help", "great to see progress", "introducing oneself" and "interesting topic". In the concluding part, new categories were added as well: "good luck/best wishes", "interesting topic/research", and "looking forward to seeing progress/reading thesis". Analyses of the contents implied that the primary purpose of the recorded feedback was presumably motivational. Noticeably, such feedback was given almost as often in specific as in non-specific positive comments. Furthermore, every sequence of non-specific positive feedback appeared to pursue motivational purposes. Finally, there was no segment of negative feedback with the purpose of motivating. Other purposes included reflection/inspiration, correction, and reassurance for correct understanding. Additionally, the inclusion of statements about personal experience or prior communication or other peer's work, as coded in the "references" category, highlighted the contextual background within which peers operated. This social or interpersonal dimension likewise became partly visible in the linguistic features that will be expounded next.

Linguistic and Non-Verbal Features of the Feedback: The detailed linguistic analysis of the recordings revealed that personal pronouns were the most prevalent verbal/auditory feature, followed by hedges/boosters, linguistic fillers, auditory emphasis, oral comment types, oral reference to text, and paralinguistic elements. All in all, the "you" perspective predominated among the three perspectives ("I", "you", "we"), closely followed by a usage of "I"-related pronouns. Notably, audio feedback exhibited a statistically significant higher frequency of "I" pronouns compared to screencast feedback ($p<0.05$). Furthermore, both audio and screencast formats featured verbal fillers (e.g. "erm") and paralinguistic cues such as giggles and laughter, reflecting a conversational style. Occasionally, there were linguistic errors in the feedback, mostly grammatical in nature, followed by word choice and pronunciation. In the case of screencasts

(N=11), visual strategies were rare overall and limited to cursor movements only. Within this category, the most coded visual aspects were scrolling through document, pointing or circling with cursor, cursor moving unintentionally, cursor moving to/clicking on button, cursor drawing object, and marking passages with cursor. This scarcity of visual strategies, paired with the absence of facial expressions or gestures, might have increased the risk of misinterpreting the emotional tone of the feedback and its contents, as the survey data confirmed.

Evaluation of Audio- and Screencasting for Feedback Purposes: From the feedback providers' perspective, **audio feedback** was regarded as easy and quick to produce (N=5), which probably was the reason why most participants used this feedback format. The ability to refer to prepared notes was seen as another advantage as opposed to talking-head videos (or combination screencasts) where the feedback givers must look into the camera most of the time (S002). Furthermore, relative to written feedback, audio feedback felt more personal (S001, S009) and more informative (S001) in the participants' point of view. More precisely, peers appreciated the personal, informal tone of audio feedback, which resembled voice notes in messenger apps when chatting with a friend. Voice recording also allowed the feedback providers to explain their ideas in more detail, while the feedback recipients were able to play it back repeatedly. The most frequently cited disadvantage of audio feedback was the lack of visualization and the difficulty in identifying what the feedback giver was referring to in the submitted texts (N=4). In addition, the absence of the feedback provider's facial expressions may have caused the feedback receiver to misinterpret the emotions of the feedback giver (S013). S012 also mentioned the possibility of producing slips of the tongue (cf. S011) or of using too many filler words when recording audio feedback. Furthermore, the asynchronous nature of audio feedback might hinder communication and follow-up dialogue (S011). Thus, the main disadvantage of audio recordings for the recipients was that the feedback was not visual (N=6). This became especially evident when the feedback provider referred to literature, terminology, and abbreviations that were unknown to the feedback recipient (S012).

The major benefits of **screencast feedback**, on the other hand, were visualization and localization (N=6), both for the feedback giver and receiver. For example, S014 wrote that "combining audio feedback with the visualization of the feedback subject is very helpful to properly show what exactly is being reviewed and facilitates following the train of thought." The main disadvantage of screencast feedback was the same as that of audio feedback mentioned earlier: Since it is not possible to see the gestures and facial expressions of the feedback provider, the recipient might misinterpret the emotional message (S002, S006). Additionally, S014 reasoned that screencast feedback "requires relatively recent technology," which could be challenging for the feedback giver. Lastly, S004 felt uncomfortable with voice recording in screencast feedback and "realized that it was unnecessarily detailed and conversational."

Similar to screencast feedback without talking-head video, **combination screencast feedback with speaker image** "help[ed] students go along with the feedback step by step and see

directly where the feedback is given" (S002). Compared to screencast feedback (screen only), the combined version was perceived as more personal for both the provider and the receiver: it "gives the feeling as [if] the one who gives the feedback is sitting near the student who receives the feedback and talking to him [sic] directly" (S002). In S002's view, it was disadvantageous that the provider had to memorize the feedback beforehand "in order not to read from the notes that I have in front of the camera (the student)." From the feedback receivers' perspective, only S003 mentioned that the video quality was poor and the download speed was slow.

Evaluation of Peer Feedback Quality and Interactions: The overall evaluation of digitally recorded feedback was less favorable compared to the feedback on digital boards. No participant gave a rating of 5 (highly useful), five participants assigned a 4 (mostly useful), and the remaining five participants selected a score of 3 (somewhat useful) or 1 (not at all useful). This more negative evaluation was due to multiple reasons. The first was the timing of the feedback task and survey. Due to the proximity of the Christmas holiday and the flu season, several students did not produce or receive peer feedback in a timely fashion. Consequently, many students completed the survey after having obtained feedback from one peer only, which might have frustrated them. This may have been one of the reasons why they wrote shorter and more negative responses in this survey. A few even submitted the survey without having received any feedback from their peers (e.g. S009 and S014), which resulted in missing data for several questions. The second possible reason relates to perceived disparities in topic expertise: Some students felt that peers at the same stage of thesis preparation were not qualified to provide useful feedback (S006, S007). More advanced students (e.g. S001), in turn, were sometimes dissatisfied with the quality of the feedback they obtained, whereas less advanced students (e.g. S004) expressed uncertainty about processing feedback from more experienced peers. Also, some feedback-receiving students felt that it was too early to obtain feedback, as they were still in the preparatory stage of their research design (S004). The third set of reasons for the negative evaluations centered on the chosen digital feedback methods. Key criticisms included the asynchronous delivery, which limits dialogic interactions, and the lack of visual cues and strategies, especially in audio feedback. Indeed, many participants used audio feedback for convenience and speed and often recorded relatively short clips only. As many respondents criticized, the audio feedback did not contain visualizations, so it was more difficult for the recipients to locate and realize where the feedback provider was referring to. Based on the survey results, short, non-specific, non-interactive voice recordings therefore may not be the most ideal form for peer feedback at this stage in the thesis process.

Points of Convergence and Divergence in the Data Sources: Both data sources underscore some inherent limitations of digitally recorded feedback, notably that the asynchronous nature of digitally recorded feedback hampers the establishment of dialogic exchanges. Survey respondents noted that the asynchronous format "weakly supports the dialogical nature of feedback" (S002), a sentiment corroborated by the feedback analyses, where only one recipient

recorded replies as audio files. Another prominent disadvantage identified in both the survey and the feedback analyses was the absence of visual elements, especially in audio feedback. Survey respondents frequently mentioned that the non-visual nature of the recordings made it difficult for recipients to pinpoint where the feedback provider was referring to within the text. Similarly, the multimodal analyses revealed that both audio and most screencast feedback suffered from insufficient visual strategies (e.g., use of cursor movements), which undermines its possible affordances in terms of clarity and specificity.

Overall, the survey respondents rated digitally recorded feedback more negatively compared to digital boards, with no ratings in the "highly useful" category and several low ratings. Despite this dissatisfaction with the utility of the feedback, the detailed coding of the recordings revealed that motivational cues — whether delivered specifically or in a more general, non-specific manner — constituted a major portion of the feedback contents, along with corrective and reflective elements. Hence, the peers largely aimed to encourage and support one another during this critical phase of the research planning process. The negative evaluations captured in the survey therefore frequently resulted from extrinsic factors (such as timing issues and incomplete feedback exchanges) rather than from the inherent quality or potential richness of the recorded feedback contents. Similar to digital boards, the survey results again highlighted concerns about imbalances in topic expertise. For example, advanced students felt that feedback from peers at a similar preparatory stage was insufficiently informed, while less advanced students were not yet ready to process higher-level feedback. These (inter-)personal factors cannot be retrieved from a content analysis of the feedback, rendering both data sources valuable for the research. Moreover, since the differentiated elicitation of perspectives of the feedback providers and recipients revealed partly different advantages and disadvantages, it makes sense to examine the two perspectives in future surveys as well. This is also needed for logistical and practical reasons, since not every participant receives feedback in the same mode as they produce it for their two peers themselves.

Conclusions and Implications: In summary, while audio feedback offers advantages in terms of ease of production and the potential for personalized, detailed commentary, it also presents significant limitations. The absence of visual cues and the asynchronous nature of the recordings seem to impede interactive dialogue and may contribute to misinterpretations of feedback intent. Additionally, imbalances in subject expertise among peers further complicate the feedback process. These findings suggest that, for the methodological planning and drafting phase, participants might benefit from additional training and design modifications concerning digitally recorded feedback. For instance, a strategic utilization of visual cues in screencasts could mitigate misinterpretations and thus enhance clarity. Furthermore, feedback exchanges should occur in a timely and interactive manner, which requires a careful pedagogical design as well as participants' interest and commitment.

5.1.3. Response to RQ3: Peer Feedback in Online Forums

This section presents a summary of the findings about digital peer feedback exchanged in online forums during the research proposal presentation phase.

Prior Experience: Participants' prior experience with online forums was mixed, with 46.2% having used them before and 53.8% not. Among the forum users, most (83.3%) had previously engaged with forums on learning platforms, e.g. to raise open questions in seminars or provide feedback. Similarities between earlier forum activities and the current seminar task were noted (S012), whereas others had utilized forums for different inquiries, such as technological issues or travel advice. Also, the frequency of forum usage varied, ranging from weekly to rarely. Generally, though, the participants believed that online forums can be helpful.

Tool Options and Data Characteristics: Online forums, as implemented on the OPAL platform, offered a set of functions that were familiar to students but remained more limited compared to digital boards. Key features included the ability to view all feedback entries in a chronological list and simple functions such as "thumbs up" for endorsement (N=22 out of 62 entries, i.e. 35.48%). Unfortunately, there is no data available as to who gave a "thumbs up"/like. Compared to more visually and interactively oriented platforms, forums primarily rely on text, which has implications for clarity and emotional nuance. However, it was possible to insert a profile photo, as done by S012, or to upload additional files, which nobody did.

Feedback Directions and Interactions: Similar to cloud applications (e.g. digital boards), forums straddle the line between synchronous and asynchronous communication. Feedback in the forum setting predominantly followed a one-directional pattern, with only two students (S005 and S011) engaging in follow-up responses. S005 answered all the forum entries he received (N=8) but S011 replied to only one. Thus, there were N=9 responses in total (14.52% relative to 62 forum entries). This lack of immediate interaction may lead feedback providers to perceive their contributions as undervalued, thereby diminishing the potential for a dynamic exchange of ideas. However, the straightforward structure of each forum led to a different kind of engagement that was not observed in the previous feedback formats. Before contributing their own feedback, several students tended to review already existing peer comments, which can stimulate more diverse perspectives on the one hand (as noted by S001 and S007) and potentially bias their individual feedback on the other hand (S013).

Feedback Structures: Generally, the forum entries were structured into three main parts: an introductory segment that typically included a greeting and an expression of thanks for presenting the thesis; a main body where the actual feedback was presented; and a concluding section where the feedback providers hoped that their feedback would help. In that concluding part, N=10 peers also stated that they were looking forward to reading the thesis and seeing progress, and N=5 peers invited the feedback recipient to further dialogue. In each feedback response, there was likewise a greeting by using the name and a goodbye. In the main part, the

feedback recipients thanked for the feedback (in one response even twice) and provided explanations; in two cases, they referred back to their presentation.

Feedback Contents and Purposes: Most feedback in the online forums was topic-related or about the research method or the presentation as such. Moreover, the majority of comments instantiated specific positive feedback. Neither non-specific positive, non-specific negative feedback nor feedback with unclear valence was detected. Overall, the feedback seemed to serve three primary purposes: motivation, reflection/inspiration, and reassurance for correct understanding. As opposed to the recorded feedback, notably screencast feedback, no corrective feedback was provided. In total, N=15 references pertaining to seven categories were found in the 62 forum entries, mostly referring to communication in real life, to sources, and to their own working experience.

Linguistic and Non-Verbal Features of the Feedback: Most coded sequences related to language aspects were pronouns and linguistic hedges. In the forum entries, the "you" perspective was predominant, followed by the "I" perspective, whereas the more inclusive or collective "we" was used least. Conversely, the "I" perspective predominated in the authors' responses, followed by the "you" perspective. However, there was no "we" perspective, and no questions were asked back. In terms of visual aspects, a total of only N=8 typographical adjustments were detected in the feedback comments, including underlining, bullet points, numbering, heading, and bold font. Moreover, no student utilized the forum's file attachment function, which would have enabled the inclusion of audiovisual or multimedia elements. The limited use of typographical and other visual features implies that students did not fully seize the platform's scope of functions to heighten clarity and interactivity through multimodality.

Evaluation of Online Forums for Feedback Purposes: Regarding their suitability for feedback purposes, online forums were found to exhibit similarities with digital boards due to their intermediary position between synchronous and asynchronous communication. On the one hand, both facilitate the gathering of information and encourage contributions; on the other hand, both hinder interaction due to their asynchronous nature. From the perspective of the providers, forum feedback can be provided quickly, is easily accessible, simple to structure, and does not require much technical knowledge. Moreover, the feedback givers can take their time to carefully consider the contents of their comments before posting them. For those receiving feedback, seeing all feedback in chronological order on one page was considered beneficial. Especially as compared to audio- or video-based feedback, the written format of the forums made it easier for the feedback recipients to skim the contributions for important information, annotate comments and take notes. One aspect that was not mentioned in the preceding surveys was that participants perused other peers' comments before providing their own feedback[17]. This was seen as an advantage by some participants (S001, S007) since it encouraged

[17] In fact, this was already possible with all preceding feedback in the TRC because all links and files were shared in an "open feedback environment" (Wood, 2019), i.e. the course cloud to which all

them to provide diverse feedback from different perspectives. By contrast, it was considered a disadvantage by other participants because it might bias their own comments (S014). S009 also feared that some peers would copy and paste other peers' feedback. Beyond that, forum feedback shares the limitations of other types of written feedback, especially when contrasted with audio and screencast feedback, which was utilized in the preceding step. In particular, participants highlighted that the written format sometimes failed to convey emotional nuances effectively (S012) and to communicate meanings clearly (S002, S004, S006, S007, S012, S013).

Evaluation of Peer Feedback Quality and Interactions: Opinions about the overall quality of the peer feedback in the forums were ambivalent. On the one hand, the structured nature of the entries and the opportunity to reflect before posting were seen as beneficial. On the other hand, the relatively low rate of reciprocal interaction — with only 14.5% of the entries prompting a response but no follow-up — suggests that the forum did not create a dialogic environment. However, it needs to be borne in mind that forum feedback functioned as a preliminary review of the submitted presentations before they were discussed in more detail in the subsequent live session (cf. S004). Some participants complained about the broad, unspecific and brief nature of the written comments (S012, S005), which might have been motivated by the feedback providers' desire to complete the task quickly. The resultant risk of misinterpretation inherent in text-only communication was a recurrent concern, as was the possibility that feedback recipients might disregard the comments entirely (S005, S008, S009). These factors indicate that while forums provide a convenient and accessible medium for feedback, additional measures might be needed to promote more engaging and interactive exchanges. Moreover, the opportunity to see preceding posts sometimes encouraged more diverse feedback, although it also introduced risks of conformity or duplication (S009, S014).

Points of Convergence and Divergence in the Data Sources: Both data types indicate that forums offer a user-friendly environment. The survey highlighted that the written format of forum feedback was easily accessible and allowed participants to reflect before posting. Similarly, the feedback analysis revealed that forum entries generally followed a clear structure (introduction, main body, and conclusion), which facilitates clarity and ease of review for the recipients. On the other hand, both sources suggest that the medium's constraints can impede the delivery of precise, actionable feedback. The written nature of the feedback might lead to vague and ambiguous comments, especially when paired with the pressure to contribute comments to a large number of peers. In that respect, survey respondents sometimes attributed the production of generic and brief feedback entries to a lack of intrinsic motivation in favor of fast task completion. In contrast, the forum feedback analysis yielded a more detailed breakdown of the contents, showing that when feedback was provided, it often followed a structured format

participants had equal access. However, the clear structure and consistent layout of the forums seemed to encourage the skimming of previous peer contributions to a greater extent, especially as compared to recorded messages.

and included attempts to motivate or reassure. This contradiction highlights that while task-oriented behavior may undermine feedback quality on a surface level, there still appeared to be an underlying effort to structure and deliver meaningful feedback on the participants' side.

The survey responses offered further insights into the feedback provision strategies that were not immediately discernible from the feedback data, notably about the perusal of other peers' reviews. Some respondents perceived this as beneficial, as it encouraged the incorporation of diverse perspectives; others worried that it could bias their feedback or lead to mere replication of comments. Conversely, the content analysis brought to light that the actual level of interactive engagement was minimal, although the platform's features theoretically support interaction (e.g. by displaying all posts in chronological order) and were perceived positively by most students in the surveys. The low exchange rate in the forums thus reveals a discrepancy between the intended and the realized level of peer-to-peer communication, but might have been caused by the pedagogical design that incorporated opportunities for synchronous discussions shortly afterwards.

Conclusions and Implications: In sum, the findings from the surveys and feedback analyses show that online forums share several key characteristics with digital boards, as both platforms exhibit a blend of synchronous and asynchronous interaction, which can facilitate the collection of diverse perspectives but can also impede interactive dialogue. Addressing these challenges may require integrating additional strategies that encourage more dynamic interaction, such as prompts for follow-up responses, or awareness-raising of additional modalities that could be accomplished by file uploads to enrich emotional and contextual cues.

5.1.4. Response to RQ4: Summative Course Evaluation

Research question 4 inquired into students' self-perceived learning gain at the end of the colloquium, i.e. after having engaged with various digital feedback methods for peer review.

The first part of the summative course evaluation survey consisted of 17 statements on a five-point Likert scale. It was found that the participants were satisfied overall with the TRC implementation in winter term 2022/23 (question 15, M=4.77 from a maximum of 5 points). The three questions with the highest mean scores were all related to the instructor (questions 7, 8, 9) and received mean scores of M=4.85, M=4.85, and M=4.92, respectively. The three lowest scores referred to the fellow students, namely that the course had too many participants (question 12, M=2.46/5), that other participants were interested in the course (question 3, M=4.08/5), and that teamwork was encouraged (question 4, M=4.38/5). However, for the latter two statements, the average scores were higher than 4, i.e. "high" agreement was nevertheless reached (instead of "full" agreement). Accordingly, we can state that students' overall learning gain was perceived as high. Compared to previous years, when the digital peer feedback design was not yet implemented in a systematic way, statistically significant increases were noted for several critical dimensions, including cooperative (item #4; $p<0.05$) and self-directed learning (item #5;

$p<0.05$) as well as the development of students' methodological competencies (item #6; $p<0.05$). The growth was even highly significant for the general learning gain from the seminar (item #16; $p<0.001$) and its inspirational nature (item #17; $p<0.001$). The systematic incorporation of digital (peer) feedback along the various phases of the research planning process thus led to noticeable improvements.

In the TRC 2022/23 implementations, students additionally replied to open responses in part 2 of the questionnaire. The participants underscored that they had appreciated the opportunity to exchange information with other students (S004, S005, S011, S014) as well as the positive course atmosphere that was created or that arose through this process (S005, S013). In their point of view, the colloquium was also effective in helping students prepare their qualification thesis (S008, S012). The aspects of the TRC that could be improved from the participants' view can be divided into two areas. One concerns the course contents and peer contributions: Some respondents mentioned that the quality of the peer feedback they received was low (S001, S005, S012), that the number of feedback tasks in the course was too high (S012, S014), and that they desired more input or discussion about research methods and data analysis (S004). Another issue concerned the course format: They would like to have more offline sessions (S013) or receive individual consultations (S011). Some of these aspects were difficult to achieve due to the high number of students in the colloquium. Regarding the low quality of peer feedback, more comprehensive feedback training and guidance could be offered in the subsequent semesters (see discussion section 5.7.2)[18].

In response to the open-ended question that inquired into the perceived usefulness of the digital feedback methods, most *participants* considered forum feedback (7/15, i.e. 46.67%) to be most useful, followed by screencast feedback (4/15, 26.67%) and audio feedback (3/15, 20%). However, when considering the actual numbers of feedback *recipients* in the distinct formats (see section 4.8.1), we obtain slightly different percentages: forum feedback (7/10, i.e. 70.00%), screencast feedback (4/7, 57.14%), audio feedback (3/11, 27.27%). Hence, for recorded feedback, the majority favored screencasting (S002, S003, S004, S014), whereas only a quarter (S001, S009, S013) assessed audio feedback as most useful. Looking at the reasons that were adduced, we notice that audio feedback was mainly seen as advantageous from the providers' perspective (practical reasons) rather than from the recipients' standpoint (comprehensibility). Similarly, practicality was prominent for forum feedback: Respondents reasoned that it was easy to provide (S012, S014), timesaving (S012, S014) and easy to structure (S012). Participants who preferred screencast feedback found the passages easy to locate for both the

[18] In the current colloquium, it was assumed that most participants were already familiar with (digital) feedback because a seminar about this topic had been offered in the preceding semester. The training was therefore cut short, mainly by citing publications about feedback as a reminder. On the other hand, there were also some students who had not attended the previous course. Therefore, an additional session should be scheduled in the future to heighten the quality of the feedback contents. Moreover, guiding questions for feedback requests, feedback provision, and feedback use could be offered.

feedback giver and receiver (S002, S003, S004). Those who preferred audio mentioned that hearing the feedback giver's voice could reduce misunderstandings (S013). These responses resonate with the foregoing formative survey results. However, no participant referred to feedback on digital boards in this question, which stands in contrast to the usefulness ratings in the formative questionnaires 1, 2 and 3. A likely reason for this is that students remembered the last digital method, i.e. forum feedback, best when answering this question in survey 4 (see section 4.11.3).

The implications of these observations and findings for subsequent implementations of the teaching and research approach will be discussed in sections 5.5 to 5.7. Beforehand, a joint consideration of the results will be undertaken in section 5.2, as well as a comparison with prior research in section 5.3, to outline the main insights gained from the current research.

5.2. Joint Consideration of Results

The sequenced assignment and feedback design (see section 3.4) was meant to provide students with adequate scaffolding, heighten their awareness of the complex and iterative nature of the research and writing process, to improve students' time management and time investment (cf. Frattarola et al., 2024, p. 7) as well as to increase their active role in the learning process, promote dialogue about their research (cf. Frattarola et al., 2024, p. 8) and ultimately improve the quality of their theses.

Indeed, the analysis of the peer feedback received through the three digital feedback methods and the online surveys revealed generally positive results. However, challenges were likewise encountered, which were sometimes peculiar to specific feedback methods and tools, but sometimes of a more general nature. Some key findings are summarized in Figure 122.

First, the cloud feedback on digital boards was mostly perceived as highly useful, since it facilitated interactive exchanges. However, students found it difficult to provide local feedback on specific formulations – unless a cloud-editor was used. Second, for the recorded feedback, audio messages were created more often than screencasts. The reason was that audio feedback was easy to produce as it resembles voice messages on social media and helps to establish emotional connections. However, this could also result in conversational, unfocused and unstructured feedback. Even more so, written entries in the forum feedback were considered as easy to produce. Moreover, since the forums can be skimmed easily, some students were inclined to read the feedback the other peers had provided. Some said that this helped them contribute additional suggestions and gain new ideas, whereas others feared a possible decline in multi-perspectivity if peers simply agreed to others' opinions. The main affordance of screencast feedback, in turn, was seen in its ability for visualization to enhance clarity. In fact, however, visual clues were only utilized sporadically by the feedback providers. Furthermore, participants deplored the reduced interactivity of most asynchronous feedback methods, which means that follow-up discussions hardly ever took place in the asynchronous formats

(with the exception of digital boards). Throughout, it was occasionally noted that the peer feedback was sometimes vague and superficial and therefore perceived as less useful.

Data Sets	Formative Survey Results & Affordances	Perceived Challenges
• 14 participants • **14 digital boards** • 134 text comments • 37 author responses • 4 replies to author's response	• N=14: 50% highly; 29% mostly useful • Facilitation of interactive exchanges • Appropriate tool choice and adequate settings important, e.g. structure of board, possible re-arrangements of content, (non-) anonymous feedback	• Difficult to provide local feedback on specific formulations • Superficial feedback due to (perceived) lacking expertise

• 12 participants
• **27 recordings**
  • 16 audiocasts
  • 11 screencasts
• 2 author responses (audiocasts)
	• N=10: 50% mostly; 40% somewhat useful
	• Audio feedback is easy to produce and resembles voice messages on social media
	• Oral feedback is usually more elaborate than written feedback
	• Greater emotional support possible
		• Lacking visualization
		• Possibly unfocused, unstructured oral feedback
		• Asynchronicity reduces interactivity

• 14 participants • 10 forums • **62 forum entries** • 1 announcement • 9 author responses	• N=9: 22% highly; 44% mostly; 22% somewhat useful • Written entries are easy to produce • Increase of multiperspectivity by reading other opinions: new insights or reassurance • Helping peers and learning from peers	• Often general or vague feedback • Only partly interactive • Possible decline in multiperspectivity: agreeing with peers

Figure 122: Comparative Summary of Key Findings per Digital Feedback Method

Figure 123 supports these findings through a collection of quotes from the formative surveys and the conclusions drawn from them.

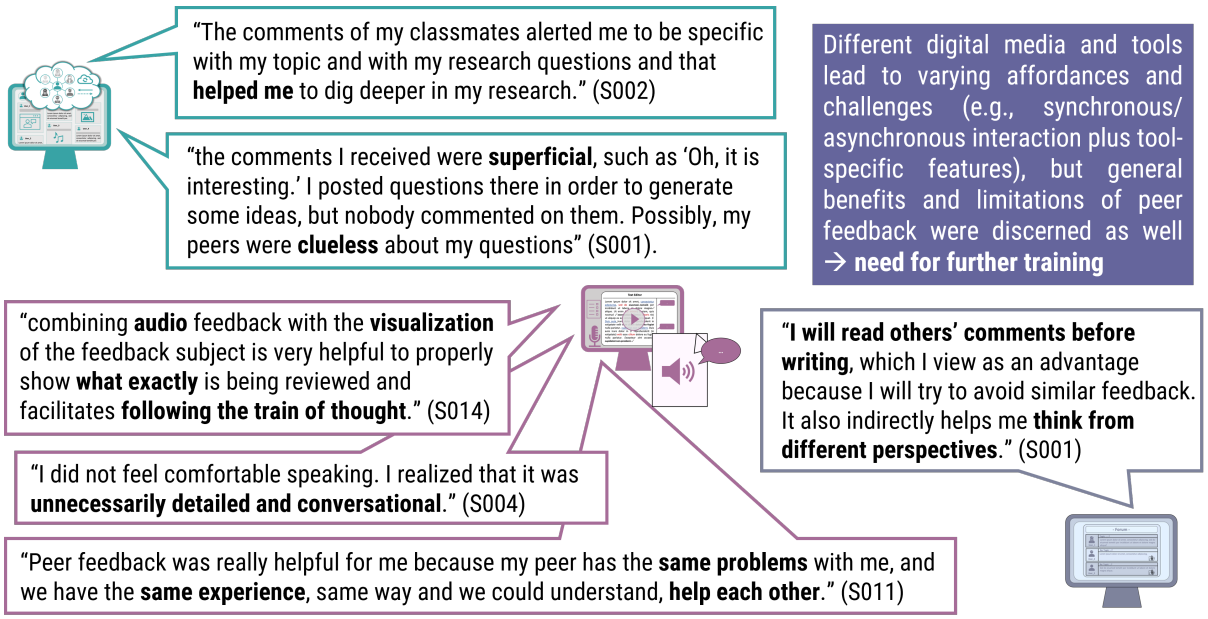


Figure 123: Participant Voices and Needs per Digital Feedback Method (emphasis added)

The quotes demonstrate that not only shared experiences and problems can be helpful, but also different perspectives. Additionally, the impact of specific digital media and tools was

observable, as each one has different affordances and challenges. On top of that, general benefits and limitations of peer feedback were noticed, which points to a need for further training in peer feedback and digital media use.

Overall, though, participants' satisfaction with the course showed a significant increase between 2020 (before the intervention) and 2022/23 ($p<0.05$). The perceived learning gain and the seminar's inspirational nature experienced the highest increases, with $p<0.001$. The data triangulation of student perceptions, feedback analyses, and course evaluations underscores the usefulness of the pedagogical design. However, a closer look at feedback perceptions, processes and products revealed that more intensive training in the provision of (peer) feedback could prove valuable in future implementations. In general, guiding questions might help students to structure their feedback and to consider a wider variety of assessment criteria, as well as to engage in more in-depth critical reflection. This could also reduce the superficial nature of some comments (S001, S005, S012), although these fulfilled a motivating function to some extent. For example, S005 criticized the quality of comments in all feedback modes, although he felt that the feedback kept him "on track with working on [his] thesis" and helped him to "greatly expan[d] on the literature sections and the research direction" (written feedback to instructor). Looking more closely at the nature of comments he received, we observe a discrepancy between the feedback received and feedback perceived. Overall, S005 did not receive any non-specific comments. Most feedback even contained recommendations for improvement, as Table 64 reveals.

Table 64: Overview of Positive and Negative Feedback Provided to S005

General feedback strategies	Board feedback	Recorded feedback	Forum feedback	Total
Sequences of specific positive feedback	8	3	5	**16**
& Recommendations to positive feedback	5	0	4	**9**
Non-specific positive feedback	1	2	3	**6**
Sequences of specific negative feedback	4	4	4	**12**
& Recommendations to negative feedback	3	5	4	**12**
Non-specific negative feedback	0	0	0	**0**

Altogether, S005 obtained more positive feedback than negative feedback, even though he seemed to have favored the latter. However, even N=9 of the 16 sequences of specific positive feedback contained recommendations, indicating pathways for further improvement. Moreover, virtually all passages with specific negative feedback included suggestions for improvement. Additionally, it should be noted that S005 was the only person who responded to all forum comments and might have expected more interaction with his peers.

However, there were some differences across the feedback media employed. Altogether, we observed that most comments were specific positive in the digital board and forum

feedback activities as well as in the audio feedback, whereas in the screencast feedback, more specific negative feedback was given. A positive point regarding the feedback quality is that no non-specific negative feedback was provided across all digital formats. In board and forum feedback, most comments instantiated specific positive feedback. In the recorded feedback, more specific negative feedback was given in total. However, in the audiocasts only, more specific positive feedback was included. In digital board feedback and in the audiocasts, unclear tendencies of feedback were found. In screencast and forum feedback, no unclear valence was detected. Content-wise, most feedback across all three feedback methods was either topic-related, about the research method or the research plan. Further common feedback objects were research questions, purpose/significance of the study and literature/sources.

On the digital boards, the comments mostly seemed to serve reflection and inspiration, but also motivational purposes, which is quite fitting at the early stage of idea generation and topic search. At a later stage, when the students drafted their research plans, not only motivational feedback, but also corrective feedback (especially in the screencasts) as well as questions for clarification were detected. All this seems to be crucial at this important planning phase when it is necessary to fine-tune the direction that the research is going to take. Finally, in the forum entries, we again found several motivating comments, which is essential to encourage the peers to continue their work on their thesis even beyond the seminar.

Altogether, the perceptions reported in the surveys often confirmed but sometimes contradicted the findings from the feedback analysis. For instance, comments that seemed to fulfill a motivational function might have been interpreted as superficial by the feedback recipients, lacking the desired depth that would have helped them move forward. Also, the feedback receivers' perceptions of the feedback quality and peers' (lack of) expertise were revealed by the surveys (e.g. S012 in the summative course evaluation; section 4.11.2.2). Heterogeneity, in that respect, was sometimes considered an asset, sometimes a challenge.

Furthermore, the survey responses gave insights into the strategies the feedback providers and recipients adapted as well as the reasons for utilizing them. For instance, the analysis of feedback products usually does not reveal whether the students had read other peers' comments, unless they explicitly referred to them (e.g. through references to earlier communication and other peers' work). In the surveys, by contrast, the participants sometimes stated that viewing other feedback either helped them to "think from different perspectives" and "avoid similar feedback" (S001 in section 4.5.2.1 about forum feedback) or that it potentially biased their own contributions (section 4.5.3.3). Likewise, students' motivations for choosing one feedback method over another (here with respect to types of recorded feedback) were disclosed through the surveys, such as their familiarity and ease of use in producing audio feedback. From the recipients' side, though, challenges were encountered, notably a lack of clarity in referencing. This would speak in favor of choosing a different feedback format, in this case screencast feedback rather than audio feedback. Similarly, in terms of additional needs or

recommendations, the surveys turned out to be a valuable resource. For example, with regard to the dearth of visual strategies in the screencasts, some survey respondents indeed recommended that the feedback providers should utilize the cursor, highlighting functions and other signs to pinpoint the aspects they are referring to (S004, S009, S014; see section 4.4.3).

Finally, the feedback analyses as well as the survey findings led to similar conclusions, particularly concerning the need for additional training and guidance in peer feedback and tool use. Overall, the results from the present study align with previous research in several ways, but also make new contributions, as will be outlined in the next sections.

5.3. Comparison with Findings from Prior Research: Focus on Digital Peer Feedback

This section will compare key findings from the current study to results obtained from prior research, focusing on peer feedback, pedagogical design, and the distinct digital feedback methods that were employed.

5.3.1. Peer Feedback

In the prior literature, the possible benefits as well as challenges of peer feedback have been foregrounded frequently (see section 2.3). However, the ways in which different digital tools and methods promote peer feedback interactions have not been thoroughly explored so far. The present study therefore investigated peers' perceptions and utilization of several digital tools from feedback providers' and recipients' perspectives. A particularity of the participating student group was their multifaceted heterogeneity, such as their noticeable variation in their academic, linguistic and cultural backgrounds, their status as Master or PhD students as well as their teaching experience and topic interests (see section 4.2, Figure 6). It was assumed that – in the ideal case – peers could profit from these varying levels of knowledge and expertise in line with social constructivist theories (Vygotsky, 1978). To maximize these potentials, an open feedback environment was created in which everybody (students and teachers alike) was able to see everyone's uploads and feedback at any time (cf. Wood, 2019; 2021; see section 3.3). This pedagogical design was meant to increase mutual learning from their own and others' contributions (cf. C. T. H. Lien, 2023, p. 9).

Indeed, some participants emphasized that "[t]he main advantage for [them] in the context of [the] Research colloquium course was to learn about other people's projects" (S004; section 4.5.2.1). Also, the mean score for collaborative learning increased significantly as compared to the former pedagogical design of the TRC (see summative survey results in section 4.12). This resembles participants' voices and research findings from prior studies on peer feedback that underscored students' learning from their "friends' writing and their ideas so that [they] can avoid some mistakes" (student cited in C. T. H. Lien, 2023, p. 9; emphasis omitted; cf. student quoted by Albarqi, 2023, p. 189), and aligns with the overarching benefit of collaborative learning, which is "learning with and from each other" (Boud, 2001, p. 2, in section 2.3.1).

A recently cited advantage, especially in open and multi-peer feedback scenarios, is students' engagement with diverse viewpoints as well as the resultant critical thinking and increase in multi-perspectivity. In particular, such findings have been reported for peer feedback in online forums (e.g. Mansour, 2024, p. 15977; Mudau & van den Berg, 2023, pp. 8–9, 11; Schaefer et al., 2019, p. 1365; Steenkamp & Brink, 2024, p. 6; Torres & Satti, 2024, p. 41) and lately also for digital boards (Rath, 2025, pp. 1, 5). Similarly, in the present project, forums seemed to facilitate this engagement with different perspectives (cf. section 4.5.2.1), as will be elaborated further below (section 5.3.4).

Seeing the projects and process of others as well as engaging with them was considered beneficial by several participants in the present study (S004, S005, S011, S013, S014, in section 4.11.2.1). For example, S013 stated that "listening to other, more experienced participants' projects was also very helpful to [her]" and that the positive course environment motivated her "to keep going" (summative survey in section 4.11.2.1). Similarly, students in earlier studies sometimes emphasized feeling motivated to improve their own performance once they see "excellent writing from others" (D. M. T. Nguyen & Trang, 2023, p. 3407; cf. student cited in C. T. H. Lien, 2023, p. 9). Additionally, S005 underlined that the peer feedback exchanges can "keep motivation to work very high" (section 4.11.2.1). Notably, the reception of feedback from peers who are "one academic step further" (S012 in section 4.11.2.2) was considered helpful. Thus, in line with preceding studies, several students felt motivated by the feedback they obtained from their peers. For instance, referring to Gikandi et al.'s (2011) study, A. S. Alharbi (2025) concluded that "[p]ositive recognition of their progress by classmates serve[d] as a powerful motivator, encouraging students to maintain effort and refine their language skills" (p. 6). This is astonishing since prior research usually focused on the same task, notably essay writing on a particular topic, whereas the individual research projects of the TRC participants differed largely, which might have reduced the chances for an immediate transfer to their own learning situation. However, the stages of the research planning process and overall goal (thesis writing) were similar for all participants, thus facilitating learning transfer.

On the downside, the quality, depth and usefulness of peer feedback can differ greatly (A. S. Alharbi, 2025, p. 21), so some participants were dissatisfied with the peer comments they received (see e.g. S001, S005 and S012 in the course evaluation survey; section 4.11.2.2). Partly, this is dependent on the efforts, motivations (see reasoning by S005), knowledge (S012) and skills of the peer reviewers (Steenkamp & Brink, 2024, p. 8) as well as on their interpersonal relations (e.g. face-saving strategies among friends; Tseng & Er, 2024, p. 143). It should, however, be noticed that the students who mainly expressed dissatisfaction with several peer remarks belonged to the same group in the recorded feedback task (S001, S005, S012), with e.g. S012 appreciating the quality and usefulness of the comments she obtained from her two colleagues (see section 4.11.2.2). It could be presumed that due to their own high standards, they also expected high-quality feedback from all other fellow students (cf. Hui et al., 2024, p. 343,

in section 2.2), which they did not receive in a consistent manner in the multi-peer feedback tasks on digital boards and forums. In particular, students were dissatisfied with the quality of the peer feedback in the online forums (see formative survey 3 in section 4.5.3.2), even though they liked this feedback method best in the summative survey (section 4.11.3). According to S012, one major factor affecting the quality of the peer comments is their motivation and willingness to invest time, while S013 considered the peers' (un-)familiarity with the topic as a decisive factor (section 4.5.3.2). In sum, it therefore appeared that the negative evaluations, especially in the forum feedback survey, rather resulted from the insufficient quality of the contents than from the forum features.

There was also a relatively high proportion of positive feedback. On the one hand, this was viewed positively by the TRC participants, for instance when peers "encouraged [their] choice of topic" (S012 in in section 4.11.2.1). On the other hand, it was seen critically, especially when feedback was non-specific (S005 in section 4.5.3.2) and "more cursory than developmental" (F. Hyland & Hyland, 2001, p. 196). The reception of positive or encouraging comments might even discourage peers from engaging into further dialogue, such as by replying to the comments they obtained (Tseng & Er, 2024, pp. 143–144). In the present study, another reason for the low amount of author replies and visible follow-up dialogues was detected: Since the asynchronous digital feedback exchanges were immediately followed by opportunities for synchronous (live) interactions (see inverted classroom approach outlined in section 3.4), students might have refrained from contributing responses in the asynchronous formats. Others, in turn, who were not able to join the live meetings, appreciated the opportunity to engage in follow-up commenting in the asynchronous modes.

Occasionally, the analysis of cross-references in the feedback revealed additional communication that was taking place beyond the formal learning setting (see sections 4.8.4 and 4.9.9). It remains unclear, however, how many students engaged in casual conversations or informal feedback processes outside of the digital classroom environment and in what ways this contributed to their learning progress. In a recent study, A. S. Alharbi (2025) pointed to this general lack of research on digitally mediated informal peer feedback (p. 6). It might be particularly rare in academic contexts that rest on beliefs of solitary research endeavors where students mainly rely on sporadic supervisory feedback (see review in chapter 2). Specifically, Alharbi (2025) investigated informal feedback on WhatsApp and compared it to more formal feedback on the institutional course platform. To some extent, Alharbi's (2025) findings resemble the differences between communication on digital boards vs. online forums that were observed in the present study. Probably due to the note format, the peer comments on Padlet were relatively brief but simultaneously resulted in more follow-up responses as compared to the other digital formats, similar to what A. S. Alharbi (2025, p. 16) noticed about informal feedback on WhatsApp. Furthermore, students found chat feedback (A. S. Alharbi, 2025) or feedback on digital boards (current study) faster to provide than feedback in blogs (A. S. Alharbi, 2025, p. 21)

or forums (present study). This also aligns with the findings from the feedback analysis that revealed more structured entries consisting of greetings, main part and goodbye formula in the forums and recorded files, whereas only 60% of the board posts contained such an opening or closure sequence, respectively (see section 4.10.2). Additionally, participants in the present study sometimes considered recorded feedback comparable to voice messages on WhatsApp or similar chat applications (see S001 and S004 in section 4.4.2.1). A casual tone is characteristic of informal feedback among friends and stands in contrast to the more analytical tone of feedback in formal learning platforms (A. S. Alharbi, 2025, p. 16). This can also make the comments more comprehensible and actionable, increasing the likelihood of their subsequent consideration (pp. 16–18). Also, the nature of the messages implied by the digital tool and mode might prompt or hamper follow-up dialogues. Notably, feedback replies were hardly ever created in the online forums (see section 4.9.11 and summary in section 5.1.3). In that respect, A. S. Alharbi (2025) further discovered that the informal feedback seemed more encouraging and motivating to the recipients (pp. 6, 16). This could also help to reduce anxieties students might have towards peer feedback processes (p. 15). Apart from its pedagogical function (brainstorming, mind-mapping), feedback on digital boards thus appears especially fitting at the beginning stages of a course or research journey, i.e. to decrease potential affective hurdles that might hinder participation and pro-active engagement.

However, there is also a danger of "off-topic conversations and inconsistent participation" (A. S. Alharbi, 2025, p. 19), the latter of which was also observed across the digital formats in the present study. Moreover, the brevity of written notes can heighten the potential for non- or misunderstanding (A. S. Alharbi, 2025, p. 20), which aligns with general findings about written feedback in different digital formats (see section 2.6). Consequently, students in the current and in prior studies sometimes "reported dissatisfaction with peer feedback" (Steenkamp & Brink, 2024, p. 8, citing Muamaroh & Pratiwi, 2022), especially if it appeared superficial and lacked concrete suggestions for revision (e.g. Vu & Dall'Alba, 2007, cited by McConlogue, 2015, p. 1503). In that regard, it is also possible that the heavy workload of multi-peer feedback has resulted in lower-quality feedback. Therefore, variations in group sizes would be worth further examination in future studies (see section 5.7.3).

Linguistically, students typically adopted a friendly and appreciative commenting style and frequently provided positive feedback, but also constructive criticism. On the one hand, the peer approach might lead students to rather employ tentative language and positive remarks in order to save face and avoid harming interpersonal relations (e.g. K. Hyland, 1996c, p. 255; cf. review by M.-H. Chang et al., 2012, p. 295; section 2.4.7). This, however, can impact the perceived usefulness on the feedback receivers' side. On the other hand, the peer perspective may also be seized strategically by explicitly referring to common ground and shared experiences. For instance, more advanced peers (e.g. S001) sometimes referred to their own knowledge and experiences gained from writing a Master theses or researching a particular topic to support

students at earlier stages, which was, in turn, appreciated by the feedback receiver (S012; see section 4.11.2.2). This underscores the usefulness of peer scaffolding in academically heterogeneous groups (cf. Vygotsky, 1978; section 2.3.1). However, the linguistic analysis revealed that the peer perspective only rarely transpired on the linguistic level in terms of pronoun use. More precisely, the peers used the first-person plural pronoun "we" only occasionally, although it rhetorically – and in peer contexts also literally – serves to highlight common ground and connect reviewers and recipients closer together (K. Hyland, 2001, p. 559; 2005, p. 182; see section 4.7.10). It expresses and fosters peer relations while "stress[ing] the involvement of the writer and reader in a shared journey of exploration" (K. Hyland, 2001, p. 560). While this rhetorical strategy is often employed to convince readers of a certain line of reasoning in academic writing, its utilization in peer feedback contexts could instantiate a truly shared ground the peers would like to build on. As opposed to "you" directives, it would represent a more indirect way of guiding the fellow students into a particular direction (cf. K. Hyland, 2005, p. 182) and might be favored over impersonal constructions that minimize the feedback providers' presence (K. Hyland, 1998, p. 364; K. Hyland & Milton, 1997, pp. 197–198; see section 4.7.10). The utilization of such a collective pronoun may also encourage follow-up interactions, which should be explored by future research to gain clearer insights into linguistic features that possibly promote dialogic feedback exchanges and feedback uptake.

In terms of feedback contents and language features, the present study also revealed variation across the different phases of research planning and digital tools used. Similarly, Basturkmen et al. (2014) found that the formulation of comments "varied in relation to what they focused on" (p. 442). Even though their study centered on feedback comments by supervisors provided on Master and doctoral theses in three disciplines, this observation seems to represent a general tendency. Also, the predominant focus on content feedback rather than linguistic accuracy aligns with the present findings (Basturkmen et al., 2014, p. 438). This stands in contrast to the frequent emphasis on lower-order aspects, such as mechanics or style, in other peer feedback studies. To instantiate, Huisman et al. (2018) counted that 62.4% of the peer feedback referred to "aspects of style", but only 26.9% to content (p. 962). In that respect, it should be noted, though, that the feedback objects and purposes differed, which certainly has implications on the types of comments that are provided (in addition to other variables, such as topic expertise and feedback literacy). More precisely, most peer feedback studies concentrated on essay writing, not on thesis writing or earlier stages of the research planning process, which makes it hard to establish comparisons to prior research. Rather, one might discover certain parallels in terms of digital feedback methods and their individual advantages and disadvantages from students' point of view, as will be explicated below.

At any rate, these findings underscore the importance of paying nuanced attention to the impact of different digital tools, tasks and pedagogical designs on peer feedback processes, which is in accordance with sociomaterial approaches (Chong, 2021; 2022; Gravett, 2022; see

section 2.1). Therefore, the next sections will look more closely at the digital technologies that were deployed in the current intervention.

5.3.2. Feedback on Digital Boards

Digital boards enable the quick sharing of comments from a number of participants, which allows recipients to obtain a broad range of opinions (cf. Indrasari, 2019, p. 98, in section 2.6.3). By engaging with these diverse perspectives, students' "cognitive flexibility" and critical thinking can be enhanced, as postulated by previous research (Rath, 2025, p. 1). If several peer contributors adduce similar points, students might be inclined to (re-)consider these aspects more deeply (cf. K. Cho & MacArthur, 2010, p. 330; Nicol, 2010, p. 510; Rath, 2025, p. 5). Conversely, though, feedback providers could tend to simply agree with opinions that others had previously shared instead of profoundly engaging with the suggested topics on their own.

While earlier studies also found evidence of students' vicarious learning from consulting others' boards in an open feedback environment (Albarqi, 2023, p. 189; D. M. T. Nguyen & Trang, 2023, p. 3407), such a tendency was not observed in the present research. A possible reason for this could be the difference in assignment type and the diverse thematic spectrum at the early stage of research planning where everyone shared largely different and often vague ideas about their potential thesis topics. Hence, the potential learning gain from the open feedback environment was more limited here. At the final stage of research planning, though, some peers conceded skim-reading other posts, which seemed to have been facilitated by the structured layout of forum threads (see section 5.3.4).

Previous studies also highlighted that digital boards can foster social interaction (A. B. P. Sari, 2019, p. 46) and a continuous learning dialogue (McLachlan & Tippett, 2024, pp. 249–250) (section 2.6.3). Indeed, the overall number of feedback comments and of replies to peers' feedback posts was higher than in the other digital applications (section 4.7.13). However, the follow-up interactions on the digital boards were still relatively limited, probably due to the course design that incorporated scheduled synchronous meetings after each asynchronous feedback phase for further discussion of the comments and questions (see section 3.4).

Additionally, several board creators in the current study applied tool settings that resulted in possibly confusing structures and restricted the range of commenting types (see S003, S005, S008, S009, S012, S013, in section 4.3.2.1). Fixed structures, notably in tabular format, might be useful if students want to discuss several separate topic ideas (e.g. S012) or different aspects of research planning. Other fixed structures that rely on only one column, by contrast, make it hard to establish connections between individual comments as they cannot be moved freely (see S013 and S015 in section 4.7.2). For the creators of digital boards, it is therefore important to choose the most fitting settings that serve their feedback requests. This not only pertains to the general layout of the digital boards, but also to the commenting and editing features, e.g. whether comments are added as separate pads or in comment threads, whether

they automatically appear in chronological or reverse-chronological order, whether they can be re-arranged by the board creators and by the peers, whether it is possible to connect or color the posts, and whether liking or rating features are activated. In the present study, these tool settings had been utilized in very different ways, which might have impeded interactions and mutual learning (see findings in section 4.7.2).

Similarly, the peers exclusively shared text comments and hyperlinks, but no file uploads or audiovisual feedback on the boards (section 4.7.3; regarding the range of commenting options, cf. Rudenko et al., 2024, pp. 332–333; Schluer, 2022a, pp. 102–103; Sugiarni & Firdaus, 2024, p. 1147; section 2.6.3). In part, this might have been due to the fact that commenting via voice or screenrecording was not yet available on Padlet at the time of the TRC. However, it might have been accomplished via file uploads, similar to online forums (see section 5.3.4). As audiovisual feedback was neither incorporated on the digital boards nor in the online forums, it is more likely that students either preferred text-based comments for their ease of use or did not know about these alternative options. Yet, even for written comments, visual enhancements are feasible to a certain extent, as the current analyses have shown: In a few cases, students used bold font or capitalization to direct attention to specific words (see sections 4.7.12 and 4.9.10). However, these and other possibilities, such as italics, spacing or enumerations, have been seized only very rarely by the participants in the TRC study. Consequently, it would be essential to raise peers' awareness of the tool features, both from the perspective as feedback seekers, providers, and recipients (see sections 4.3.2.1 and 5.7.2.3). Only then would it be possible to seize the affordances of digital boards that would be conducive to student engagement that prior studies had praised (see section 2.6.3; e.g. Albarqi, 2023; A. Ali, 2021; Kimura, 2018; A. B. P. Sari, 2019, p. 55; Sugiarni & Firdaus, 2024).

5.3.3. Recorded Feedback

In the present study, the participants did not exploit the full range of recorded feedback types, but mostly opted for audio feedback or screencast feedback (see section 4.8.2). A talking-head was only included once at the beginning of one screencast (S002; combination screencast video according to Mahoney et al., 2019, pp. 158–159). It appeared that most students chose the feedback format that was most convenient for them, although it might not have been the preferred variant from the recipients' perspective (see survey results in section 4.4.2). Especially in recorded audio feedback, transparent referencing to particular parts of the submitted draft is challenging (S002, S006, S009, S011, S012, S014), and also unfamiliar terms and abbreviations might be hard to understand without visual support (S012; section 4.4.2.1; cf. McCarthy, 2015, p. 164, in section 2.6.4.1).

Generally, though, the recorded feedback was longer than the written comments in the forums and digital boards, which complies with the tendency towards greater elaboration in audiovisual formats observed in prior studies (see section 2.6.4.4). When compared to other

audio- and screencast studies that usually cite a duration of around five minutes per feedback file, the recorded peer feedback in the present study was often relatively short (section 4.8.1). Presumably, this resulted from students' thematic and/or technological unfamiliarity and the time expenses needed to record (extensive) voice or audiovisual comments (cf. Fang, 2019, p. 118; J. Kerr et al., 2016, p. 18; Schluer, 2021a, p. 165; Séror, 2012, p. 108; van der Zijden et al., 2021, p. 59; section 2.6.4.5). Notably, they had to pay attention not only to the contents that they intended to communicate, but also the manner in which they presented them. For example, there might be too many filler words (S012), mispronunciations (S011) or disorganized recordings (S012) (section 4.4.2.1). Even more so, the tone of the message was perceived as important (S013), also to better understand emotions (S006). This underscores the need to "moderate their mood and tone to minimize unpleasant emotional experiences" (R. N. Sari & Cahyono, 2024, p. 1210), as previous research has highlighted.

Also, other advantages and challenges resonated with prior studies, such as the repeated and flexible access (S002, S005, S011, S013, in section 4.4.2.1; S009 in section 4.4.3.1), the perceived personalization contributing to better social relations (S002 and S003 in section 4.4.2.1) on the positive side (cf. review in section 2.6.4.4), or the need for a quiet space (S011 in section 4.4.2.1) and adequate preparation (S005, S011 and S012 in section 4.4.3.3) as possible challenges. Technological difficulties in opening the files were rare (only mentioned by S003 in section 4.4.2.2), similar to what has been observed in prior studies (see review by Schluer, 2022a, p. 195; e.g. Bahula & Kay, 2020, p. 6538; A. R. Lee & Bailey, 2016, p. 146; section 2.6.4.5).

In the analysis of the recorded feedback, it was found that the files showed a similar general structure, consisting of an introduction, main feedback in the body, and conclusion, sometimes supplemented by an evaluative summary as a preview, i.e. prior to explaining the details in the main part. Research on the feedback structures in digitally recorded files is generally limited, with recent analyses conducted by Querol-Julián (2022) on teachers' audio feedback and Schluer (2021b and ongoing) on peer screencast feedback. Querol-Julián (2022) likewise identified opening and closing moves, with a general evaluation and mentioning of strengths as common elements, whereas the sequences containing criticisms and suggestions for improvement as well as references to other resources or previous feedback remained optional (Querol-Julián, 2022). While this hints at a predominance of positive feedback, the present analyses revealed a more nuanced picture: Often, there was positive encouragement concerning the topic but negative feedback about the research method, which was the focus of the peer review at that stage. What is more, the micro-structures of the opening and closing moves exemplified by Querol-Julián (2022) resembled those of the recorded peer feedback in the work at hand: Opening moves typically contained a greeting, which can be personalized with the addressee's name, as well as social expressions of interest and care (Querol-Julián, 2022).

Closing moves, in turn, might contain encouragement to keep working on the task or project, wishes for the future and a goodbye (Querol-Julián, 2022).

As for screencast feedback, the analyzed structures were less detailed than in Schluer's (2021b) peer SCFB study. Moreover, while Schluer (2021b) discovered a large variety of visual enhancement strategies, the students in the present research hardly ever deployed them. This is surprising as participants seemed to show awareness of the visual affordances when completing the surveys from both providers' and recipients' perspectives (section 4.4). Consistent with prior research, students lauded the use or deplored the absence of visual emphasis or mark-ups (cf. review by Kurt & Karabulut, 2024, preprint p. 20; see section 4.4.3.3). In fact, visual annotations, mouse movements and highlighting could be conducive to understanding, as they facilitate localization (cf. Schluer, 2021b; 2022a, pp. 188–189, 201–202; see also A. D. Ali, 2016, p. 117; Cunningham, 2019b; Kurt & Karabulut, 2024, preprint pp. 17, 20; R. N. Sari & Cahyono, 2024, pp. 1215–1216). For instance, S004, S009 and S014 emphasized the benefits of cursor movements, highlights, arrows and other elements to support the feedback, although these features were utilized only sparingly by themselves and their peers (see section 4.8.8). Recent works even call for the integration of interactive elements in screencasts to foster engagement and follow-up interactions (R. N. Sari & Cahyono, 2024, pp. 1215, 1217; Schluer, 2021b). The concerted and competent use of visual elements and enhancements in the screen- and audio-recordings of SCFB, however, presupposes not only awareness of the options that exist but also sufficient time for practice. For this reason, some first-time screencasters in the present study probably were hesitant or unable to insert visual cues, even at a very foundational level, such as marking or pointing with cursor. The inclusion of further visual mark-ups, e.g. boxing or underlining, additionally requires suitable software, such as Screencastify or Camtasia, which might come along with expenses in time and/ or money. Therefore, it would be crucial to address possible options in advance to adequately prepare the peers for producing (and perusing) screencast feedback (cf. section 5.7.2.3).

The same applies to the way in which feedback is given in recorded formats. While students might be well familiar with commenting in written modes, the shift in modality could pose additional challenges. Written feedback is often very brief and directive, whereas oral commenting tends to be more elaborate and may contain features of conversational language that simulate or encourage dialogue. Thus, feedback providers could, for instance, "include reflective questioning within screencasts, prompting students to think critically" (Ebrahimi & Ebadi, 2024, p. 22). Moreover, they might ask the viewers to pause the video or audio file to think about the feedback that has been provided so far as well as to take notes (Ebrahimi & Ebadi, 2024, p. 22). In terms of language use, evaluative comments were frequently mitigated in the present peer feedback, which aligns with prior research (e.g. F. Hyland & Hyland, 2001; Querol-Julián, 2022); however, questions or calls for actions were employed only very rarely (section 4.8.7.2).

In contrast to most previous works that characterized recorded feedback as a one-way interaction without follow-up dialogues (see section 2.6.4.5; e.g. Bakla, 2017, p. 328; Mahoney et al., 2019, p. 166; Stannard, 2019, pp. 67–68; Thompson & Lee, 2012), the present study found evidence of recipient replies in the recorded feedback. S003 recorded feedback responses for her peers even before the next live meeting, thanking the provider for their comments and explaining in how far she (will) consider(ed) them (see section 4.8.10). However, S001 also pointed to the reduced interactivity of recorded feedback, which resonates with the prior literature (section 4.4.2.1; cf. Guardado & Shi, 2007, p. 444; Liou & Peng, 2009, p. 516; J. Liu & Sadler, 2003; Zhan, 2023, pp. 98, 100). Overall, it appears that feedback dialogues can occur in asynchronously recorded formats, but that awareness-raising of the options, reflection on the benefits and limitations as well as an integration of students' preferences in the pedagogical design might lead to an even higher engagement.

5.3.4. Forum Feedback

Forum threads are usually more structured than digital boards (A. S. Alharbi, 2025, p. 16), unless creators restrict commenting on boards to threads below their own posts – instead of giving peers the opportunity to insert additional sticky notes in flexible arrangements (see section 4.7.2). The straightforward structure of forums (cf. Mansour, 2024, p. 15981, in section 2.6.5) bears both advantages and limitations. For example, S011 found them easy to use and edit (see section 4.5.2.1). Moreover, instructors or peers might provide a certain model or template of criteria to be focused on in the comment threads (Mansour, 2024, p. 15981). This would not only facilitate feedback provision, but also make it easier for the peers to skim-read preceding entries and identify similarities and differences across posts (cf. A. S. Alharbi, 2025, p. 16; Steenkamp & Brink, 2024, p. 2, in section 2.6.5). S011 even suggested a tabular format (section 4.5.2.1), which might indeed be quite profitable for the peer reviewers and recipients. However, especially on an online platform like OPAL, it is difficult or even impossible to open different forum threads in separate windows (depending on the settings). Such a multi-window view would be conducive to consulting and comparing the contributions of peers across forums, though (Mansour, 2024, p. 15981). For instance, this would assist teachers in monitoring conversations in multiple threads and in supporting peers as needed (Mansour, 2024, p. 15981), e.g. by prompting additional reflections (Torres & Satti, 2024, p. 48). Instructors' social presence and facilitation strategies might indeed improve the quality of contributions (Torres & Satti, 2024, p. 48), but also comes along with some challenges (see section 5.7.2.2). Notably, a high number of forums or forum entries can be overwhelming, not only for the teachers as facilitators, but especially for the peers (cf. Torres & Satti, 2024, p. 40). In the present analyses, though, a large volume of posts has been detected on digital boards rather than on forums, as participants' contributions declined towards the end of the semester or research planning process, respectively.

Similar to what A. S. Alharbi (2025) observed with regard to LMS-internal blogs, the structure and tone of the forum posts appeared more formal than on digital boards. Furthermore, most comments served motivational functions to encourage students' sustained engagement in the research process (section 4.9.7). Social and affective comments were likewise detected in Essa et al.'s (2023) study of online forums where students demonstrated a willingness to help (pp. 518, 523), but were also hesitant to criticize. Moreover, they found that "[m]any students who participated in this exchange had clearly read all the responses that came before theirs and took those earlier responses into account when providing their perspectives" (Essa et al., 2023, p. 518). This only became discernible in some cases in the present study, but might have in fact occurred more frequently. Future research could therefore include specific survey items that ask students about their perusal of other's posts and own commenting strategies. If it happened, students usually appreciated the diversity of perspectives that they obtained from comments in their own and others' threads (see also section on peer feedback in 5.3.1). The following quotes from participants in preceding studies may serve illustrative purposes:

> "Engaging with diverse perspectives in the threads widened my understanding." (student cited in Mansour, 2024, p. 15977)
>
> "Viewing other students' reactions to readings is the most valuable to me." (student quoted by J. Chen & Bogachenko, 2023, p. 9942)
>
> "The discussions increased my thinking skills because I was able to come up with fresh ideas as I engaged with other students and the lecturers." (participant cited by Mudau & van den Berg, 2023, p. 11)

Accordingly, a recurring theme was "learning from each other" in both prior (Steenkamp & Brink, 2024, p. 7; see also Mansour, 2024, p. 15977; Mudau & van den Berg, 2023, p. 9) and current research. Some even acknowledged having discarded or "chang[ed] some of their initial thoughts because of the posts and responses from peers" (Mudau & van den Berg, 2023, p. 8; cf. comment in the research proposal written by a student in the present study).

While the perusal of previous posts also entails the risk of a reduction in multi-perspectivity (see Gao & Chen, 2025, p. 36, in section 2.3.2), the present study has shown that much depends on students' attitudes towards learning. To exemplify, S001 stated, "I will read others' comments before writing, which I view as an advantage because I will try to avoid similar feedback. It also indirectly helps me think from different perspectives" (section 4.5.2.1). Opposed to this, S014 felt biased by reading other's comments before contributing her own (see section 4.5.3.3). She was too curious to see what her peers had posted and feared that this may have changed her initial thoughts. This is similar to Gao and Chen's (2025, p. 36) concern that students might refrain from contributing a different opinion when they see the feedback that others have already inserted (see section 2.3.2).

One solution could be to write one's comments in a separate document while watching the peer's presentation and then to insert their notes into the forum. However, students may also browse through the previous forum entries to identify similarities and differences to their own thoughts, thus clarifying connections between their own and other's ideas. Put differently, they could refer to them explicitly in their own forum comments while nevertheless adducing the additional points that they had noted down beforehand. Thus, an adequate pedagogical design would not only enable "exposure to the opinions of other students", but also foster their critical engagement by contributing their own comments and replying to existing posts (Steenkamp & Brink, 2024, p. 6). If students see that their peers have actively engaged with their comments (e.g. by explicitly referring to them and maybe also by tagging or linking them), they might feel more motivated to engage in further dialogue, not only with the feedback recipient, but also with the other feedback-providing peers. Indeed, S013, for instance, would have desired more forum replies to continue the discussions (see section 4.5.3.3).

In prior research, some students considered online forums as inconvenient, as they had to log in every time to track new contributions (Torres & Satti, 2024, p. 45). Likewise, in the current study, the LMS-internal forum inhibited direct communication for prospective PhD students who did not yet possess their institutional log-in data, as the registration process was still ongoing. Therefore, S002 had to ask the tutor to insert the comment on behalf of her (section 4.5.2.2). Hence, she also was not able to read other peers' feedback and refer back to it or benefit from it instantaneously for the improvement of her own research. Since the forum features of the LMS OPAL were relatively limited, it would be interesting to examine alternative forum tools and students' utilization and perceptions towards them (cf. section 4.9.2).

Finally, it was observed that users hardly ever seized the various editing and upload functions that would have enabled visual enhancements (such as through bold print or italics) or oral comments in the forums. Thus, students did not move beyond simple text comments (see sections 4.5.2.1 and 4.9.3), similar to what has been observed for feedback on digital boards (section 5.3.2). Hence, there is a need for awareness-raising and training to exploit the full potentials of online forums as well as other digital feedback formats, as will be further discussed below.

5.3.5. Pedagogical Design and Digital Feedback in Research Planning

The current study used distinct digital feedback methods at different stages of the inquiry-driven research process (see section 3.4; Figure 3). Cloud-based digital boards appeared useful at early phases to support topic orientation and the identification of subsequent steps, while digital feedback at later stages assisted peers in refining and revising their research designs. This aligns with the iterative phases of planning, performing and reflecting in the IBL process (cf. Wiemer, 2017, pp. 20, 49, with reference to Zimmermann, 2000). While certain benefits and challenges of asynchronous peer feedback were shared across digital formats (cf. section

2.6.1), different tools also presented unique affordances and limitations. Since some participants did not seem to be aware of the full range of options or possibly discarded them for reasons of time or lack of familiarity, educators should schedule sufficient time for prior training and in-process coaching within an open dialogic space where students' voices and concerns are thoroughly considered. Especially within a heterogenous student group, their individual expertise in research topics, methodologies and technologies, interpersonal aspects affecting peer exchanges, communicative abilities in the foreign language, as well as sociocultural and academic backgrounds should be "recognized as resources and assets" (Soltani & Zhang, 2025, p. 425; see section 2.1). Each of these factors can have an impact on their digital feedback literacy and their (inter-)actions in terms of feedback seeking, provision and processing (cf. Carless & Boud, 2018), particularly in collaborative scenarios.

Importantly, pedagogical designs should encourage follow-up interactions among peers, not only in subsequent synchronous meetings, as was done in the TRC (see section 3.4), but also in asynchronous formats. This, however, is challenging since prior and present research has shown that asynchronous methods can inhibit interactivity among feedback providers and recipients (cf. Guardado & Shi, 2007, p. 444; Liou & Peng, 2009, p. 516; J. Liu & Sadler, 2003; in section 2.6.1). It might be worthwhile for students to take notes about additional insights and recommendations gained from the discussions in the live meetings and to insert them on the previously used asynchronous platform, notably the digital boards and online forums. That way, students can re-read the aspects and reflect on them while peers might leave further replies in a time-delayed manner. Indeed, previous publications often emphasized that the utilization of asynchronous tools can deepen reflections (cf. C.-F. Chang, 2012, pp. 72–73, and Zhan et al., 2022, p. 6, in section 2.6.1), which should thus not only be seized in preparation of a synchronous meeting but also as its follow-up, e.g. as part of action-planning and revision. In that respect, a common learning space for the integration of different digital feedback methods would be recommended, as the usage of disconnected digital tools causes an extra burden for all participants. Since the institution's LMS did not enable the incorporation of all digital feedback formats required for the implementation of the colloquium, external tools had to be utilized at several stages, such as digital boards and recorded feedback. Indeed, however, this turned out to be profitable for those who did not yet possess their institutional log-in data, because the course cloud that connected all feedback sources (except for the forums) was accessible to all participants, including external ones (see section 3.3).

To summarize, pedagogies and technologies can influence the ways in which peers will interact. In that regard, the present study has provided numerous insights; however, its limitations need to be considered critically. The next section will therefore discuss the limitations of the current research before moving on to suggested modifications in the pedagogical design, data collection procedures, and digital feedback tools.

5.4. Limitations of the Present Research

Despite careful planning, there are certain reservations of the present research. First, the sample size was limited and based on convenience **sampling** so that the findings might not be representative of a broader population. Further research in the same and in other disciplines (cf. Schluer & Meier, to appear) as well as in additional sociocultural contexts would thus be desirable to inquire into the myriad factors that influence digitally mediated peer feedback processes and perceptions. Particularly in view of the multi-layered heterogeneity of the participants (see section 4.2), future research should examine linguistic and cultural factors in digital peer feedback in more detail, especially in foreign language settings (cf. Schluer & Liu, 2024).

Additionally, it should be emphasized that the **numbers of peer contributors** varied in the single feedback activities, which might have caused biased perceptions towards the different digital methods. Notably, for the recorded feedback assignment, only two peers were asked to provide feedback, whereas virtually everyone contributed to the digital boards and most students to the forums. This might have had implications on the workload in the first and last feedback phase. Furthermore, to trace developments and conduct comparisons within and across student groups, permanent peer groups could be set up in future work (see section 5.7.3).

Moreover, there was a mixture of asynchronous and synchronous **communication modes** in the present study, with follow-up dialogues usually taking place in the live meetings or in course-external private conversations. Accordingly, the amount of feedback responses, comprising questions for clarification or feedback on the feedback, was low in the asynchronous modes, whereas the follow-up exchanges in the synchronous meetings were neither recorded nor investigated in the present study. Future research might therefore utilize observation instruments, such as video-recordings, to track the feedback conversations or ask the participants to write regular reflections about them. For instance, Y. Zhao et al. (2024) conducted a quasi-experimental study in which the students' drafts, peer comments and conversations as well as survey responses and monthly reflections were collected and analyzed. The researchers found that the peer feedback dialogues had a positive impact, as they helped improve students' understanding of the feedback and increased their knowledge and feedback literacy. However, Y. Zhao et al. (2024) concentrated on one writing activity in one genre and one mode only (p. 536). Certainly, it would be valuable to adopt a similarly complex research design to examine students' negotiation of meaning and their learning gain more profoundly; whether it is feasible across multiple modes, tools and assignment types remains to be seen.

It must be considered, though, that a comparison of feedback formats, as was attempted in the present study, is difficult, especially because different modalities with distinct characteristics are involved (cf. Cunningham, 2019a). On the one hand, the density of feedback might be higher in writing due to its succinctness, whereas feedback providers may be inclined to digress and include more social comments in speaking (see also survey findings in section 4.4). On the

other hand, as writing typically takes longer than speaking, the written comments could be more superficial. By considering the commonly lengthier feedback in the oral modes as one feedback event and comparing it against an entire digital board or forum (instead of single entries), it was attempted to overcome this bias. Moreover, each feedback sequence was coded separately since a post on a board or forum can contain more than one feedback aspect, just like the recorded feedback typically comprises several different feedback points. For future research, it is therefore recommended to take feedback sequences addressing only one feedback point as the baseline for any comparison and the calculation of means.

Another noteworthy point is that the **feedback training** was limited to some fundamental, mostly technical, aspects only. Since the TRC is the final course that students attend as part of their Master program, it was assumed that they had already gained prior experiences with feedback production in previous seminars. In fact, however, students' familiarity with interactive feedback processes as well as digital media varied strongly. In future implementations, more extensive training in peer feedback and in the utilization of digital tools would consequently be needed (see sections 2.3.3 and 5.7.2 on peer feedback training). In that respect, more experienced peers could coach the less experienced ones to increase students' active participation and peer support even further (see section 5.7.2). In addition, written manuals and video tutorials about different digital feedback methods were produced after the TRC study so that they will be available to future cohorts (cf. the review by J. Chen & Bogachenko, 2023, p. 9949, on the usefulness of video tutorials in digital feedback training). They are also publicly accessible via the online platform "Digital Feedback Map" (DFM) at https://tinyurl.com/DigitalFeedbackOverview (Schluer, 2023a). The DFM provides learners and teachers with orientation knowledge as well as concrete recommendations for implementing different digital feedback methods in teaching in order to optimize learning processes and learning products (e.g. theses). It can prove useful for students and teachers of any discipline (see section 5.6.2).

Special attention should also be devoted to students' proactive engagement in the feedback process, notably through feedback requests, negotiations and clarifications of the feedback, and their application in subsequent assignments (see sections 2.4.9 and 5.7.2.4). These points will be integrated more thoroughly in the next TRC (see section 5.7.2.4). Accordingly, future work could investigate **students' agentive engagement** in addition to the other engagement dimensions that were delineated in section 2.4.9. Originally defined as "students' constructive contribution into the flow of the instruction they receive" (Reeve & Tseng, 2011, p. 258), the notion of agentive engagement could be extended through co-construction and co-assessment approaches, as will be further discussed in section 5.8.3.

While the current study set its focus on the investigation of students' perspectives and peer feedback products, future research should also elicit **teachers' attitudes and feedback comments** to obtain a more comprehensive and accurate picture. Since the teacher was the researcher at the same time, her perspective was not explicitly examined. Future work, however,

could utilize varied approaches to collect teachers' attitudes and examine their professional development. For example, to inquire into teachers' perspectives, semi-structured interviews might be a useful instrument. Based on the qualitative insights, a survey can be created that could be implemented with a larger number of lecturers as soon as more supervisors are involved in the TRC or a similar colloquium. Furthermore, educators might be asked to keep a reflective journal or diary about their feedback experiences. Additionally, a document analysis of feedback products and course curricula would provide complementary insights.

To reduce the **researcher bias** in the present study, two research assistants were involved in data collection and analysis. Nevertheless, since the main researcher (who also was the TRC lecturer) likewise engaged in the coding process, some bias might still prevail concerning the focus that was set in the research and coding.

In the student surveys, conclusions were drawn from the participants' **self-reported perceptions and evaluations** as well as from a comparison with previous years in which the current pedagogical design had not yet been adopted at all or not yet in the same way (see section 4.12). To discover whether the findings from the current research would also apply to another student group, it would be crucial to repeat the study in a similar context again. Furthermore, a (quasi-)experimental design with a control group and experimental group might be conducted to examine the effects of the intervention more deeply. Moreover, not only the feedback provided, but also the quality of the submitted assignments and the final theses should be analyzed in future research. This would help to gain a better understanding of how the feedback might have contributed to actual improvements (Frattarola et al., 2024, p. 11).

What is more, students' survey and feedback contents could have been influenced by a **social desirability bias**, which should be acknowledged critically. This might be particularly relevant when the course instructor is also the main researcher, as in the current study (cf. Rath, 2025, p. 4). Hence, power relations between teachers and students might affect the way they respond in the surveys or act in the assignments (Rath, 2025, p. 4). Special attention was therefore paid to creating a trustworthy and supportive environment in which participants' contributions are considered as valuable but voluntary (cf. Rath, 2025, p. 4). Nevertheless, completing the questionnaires also imposed an extra workload on participants, which might have evoked more negative or shorter responses in some cases.

Crucially, the information collected via surveys constitutes self-reported data that hinges on **participants' capacity** for reflection, linguistic expression, openness and honesty. It further presupposes a sufficient level of **trust** in the handling of the research data. In the TRC, trust-building was important from the onset, as it was a precondition for the open feedback environment that was applied (section 3.3). Additionally, each survey started with a reminder that their personal viewpoints are asked for, not a textbook response or anything similar. The appreciation of students' opinions was emphasized throughout by explaining that their perceptions and suggestions would help improve the course design. The teacher also gave examples of how

student evaluations from previous terms shaped the design of other courses. Moreover, the confidentiality and anonymization of the data were ensured at course start.

However, beyond their function as research instruments, the questionnaires served an additional purpose: They were intended to encourage (prospective) teachers to reflect on the utilization and suitability of various digital feedback methods. This approach aligns with the principles of reflective practice (see section 5.7.1) and necessitates a consideration of potential intrinsic as well as external factors that influence the reflection and feedback processes. Intrinsic factors include personal, (foreign) language-related and cultural aspects, subject-specific and pedagogical knowledge, practical teaching experiences, as well as participants' expectations, attitudes, emotions and motivations (Abendroth-Timmer, 2017, pp. 109–111). The biographical information collected in the first survey showed that the TRC participants varied widely with respect to these internal variables (see section 4.2). External factors, in turn, encompass institutional frameworks, the course design and the agents involved (i.e., peers as well as course instructors), the communication media and modes, as well as the tools used for reflection and research (Abendroth-Timmer, 2017, pp. 111–112). In that regard, it is important to acknowledge the limitations of the present study, which did not allow for a comprehensive consideration of these **complex factors**. Given the multifaceted heterogeneity of the participants (see section 4.2), internal factors but also interpersonal aspects should receive particular attention in future works (cf. Schluer & Liu, 2024). Findings from such studies could also inform the development of targeted feedback trainings and didactic design strategies in particular sociocultural and institutional contexts. The present study could not comprehensively address these complexities but requires additional research. Furthermore, for the summative course evaluation, it needs to be remarked that not only the course designs varied across the years, but also the student groups and institutional factors (see Schluer, submitted). Hence, the external factors likewise deserve closer consideration.

Even though the **surveys** had been pretested, there were some hurdles that arose during their actual implementation in the TRC. In particular, after the launch of survey 3 (forum feedback), it was noted that the question about the forum feedback disadvantages was missing (see section 4.5.2). It was therefore posed as a follow-up question and incorporated into the revised survey 3 shortly afterwards. Moreover, the timing of the recorded feedback activity and of survey 2 was affected by the flu season and Christmas break. As a result, there were some delays in feedback production so that a few participants completed the survey even though they had only obtained feedback from one peer until then (see section 4.4). These temporal constraints should be considered more deeply in the future by granting sufficient time for feedback production and by sharing the survey link after all feedback has been received. Since the new study program regulations will shift the TRC to summer term from 2025 onwards, the gap resulting from the Christmas break will be avoided automatically. Finally, during the data analysis,

several further ways to improve the survey design and contents were identified. They will be discussed in detail in the following section.

5.5. Planned Modifications for Future Research Based on the Current Study

Building on the experiences gained in winter term 2022/23, we will continue to use two types of data sources: the peer feedback and the online surveys. Section 5.5.1 provides information about the survey revisions that have already been enacted, while section 5.5.2 offers recommendations for future analyses of feedback products.

5.5.1. Revision of Surveys

At the beginning of the seminar, the participants were informed about the planned data collection and utilization of their data. For this, they signed a consent form (see section 3.5). In addition to that, each survey elicited students' consent and confirmed the confidentiality of the data processing. Subsequent to the present TRC study, a more detailed English-language version of the privacy policy was created based on the German-language template provided by the data protection officer of Chemnitz University of Technology. The revised surveys thus include a link to the detailed privacy policy on their start page (https://sites.google.com/view/tuctesol-privacy-policy). Moreover, in all revised surveys, some optional questions were changed to mandatory questions to avoid that the participants overlook or skip them, as this occasionally occurred in the present study. Furthermore, individual questions that caused unnecessary complexity or vagueness were optimized, as detailed below.

First of all, the originally very complex **Survey 1** was shortened for the next implementation round. Instead of mentioning all possible options and creating filter questions for various cloud applications (Google Docs, Google Slides, TUC Cloud, Padlet, Jamboard), the focus was shifted to Padlet as the sole tool. This is because most participants used Padlet and considered it advantageous, even though they were free to choose from a variety of options. Certainly, the digital board application can be replaced by a different one in future implementations, such as TaskCards or Miro, thus requiring only a small change in the formulation of the survey questions.

As the analysis of the feedback products revealed, many of the disadvantages of Padlet resulted from unfavorable settings that the participants had made when creating their digital boards (see section 4.7.1). In the next implementation, the participants will therefore not only receive more detailed information about the possible features and options in Padlet (see tutorial video by Schluer, 2024k; Schluer & Meier, 2025), but participants' awareness of these features and skills in using them could also be elicited. In the revised Survey 1 (see Table 65), students will be asked about the Padlet structure and settings they have chosen (e.g. Canvas enabling a flexible arrangement of contents, or a Wall structure with a column-like arrangement

of contents), since this turned out to be crucial in facilitating or impeding interactions in the present study.

Moreover, to shorten the survey further, the elicitation of the feedback givers' and feedback recipients' perspectives will be streamlined and carried out in one section. Since this is the first questionnaire, biographical data are also collected, because they can be informative for the analysis (noticeably to learn about participants' heterogeneity; see section 4.2). Consequently, it is even more important to keep the other sections of the questionnaire as short as possible. Furthermore, it turned out that the group of participants was more heterogeneous than initially assumed, so additional biographical questions were needed. Therefore, question 2 "In which semester are you?" was split into two sub-questions: "Are you a Master or PhD student?" and "In which semester of your Master or PhD studies are you?". Additionally, it might be worthwhile to elicit cultural aspects in greater detail to analyze their influence on feedback seeking, feedback giving and feedback processing (cf. e.g. section 2.4.8).

In **Survey 2** (Recorded Feedback), the original question "Before our seminar, how often have you utilized the following recording types to provide digital feedback? Please tick" contained a response grid featuring the options "Other 1", "Other 2", "Other 3" and "Other 4" because the matrix format in Google Forms did not allow for free-text fields. To avoid clumsiness and ease cross-referencing, the "Other" options were changed to a separate free-text question: "If you have provided digital feedback in other ways, please indicate in what way and how many times you have provided such feedback: _____". Furthermore, a filter question was added for those peers that received feedback in two different ways: "5. In addition to _____ feedback, did you receive another type of digitally recorded feedback from your peer? If yes, what type of feedback did you receive?" Based on their answers, they move to different sections to fill in answers for a second feedback method or skip them.

In **Survey 3** (Forum Feedback), the elicitation of the feedback givers' and feedback recipients' perspectives has been streamlined by analogy to Survey 1 and will be conducted together with the usefulness assessment in one section. Moreover, as certain response patterns were identified in the analysis of Survey 3 (see section 4.5), it now became possible to convert some open questions into closed ones. Critically, in the present study, some participants gave inconsistent or imprecise answers concerning their prior usage of forums. For example, S002 chose "no" in the first question ("I haven't contributed to a forum"), but later she filled in "once a week". The same goes for S003, who chose "no" in the first question but later wrote "maybe once in a year". It is possible that the participants had different interpretations of the word "contribute" in question 1. As S012 and S014 pointed out, they used forums more for reading and browsing than for posting. It therefore makes sense to specify concrete options, such as "Posting actively", "Replying to a post", or "Reading and browsing only". In that respect, the matrix format allows for greater precision regarding the frequency or usefulness of digital feedback for these

different purposes, such as “a few times a week”, “a few times a month”, “a few times a year”, “rarely”, “never”. This pertained to the following questions:

(1) The open-ended questions “1. Before our seminar, have you ever contributed to a forum?” and “3. How often do you use forums, and do you find them helpful? Please explain” were converted into a matrix format and thus transformed into a closed question. Additionally, the content of question 1 was refined, as shown in Figure 124:

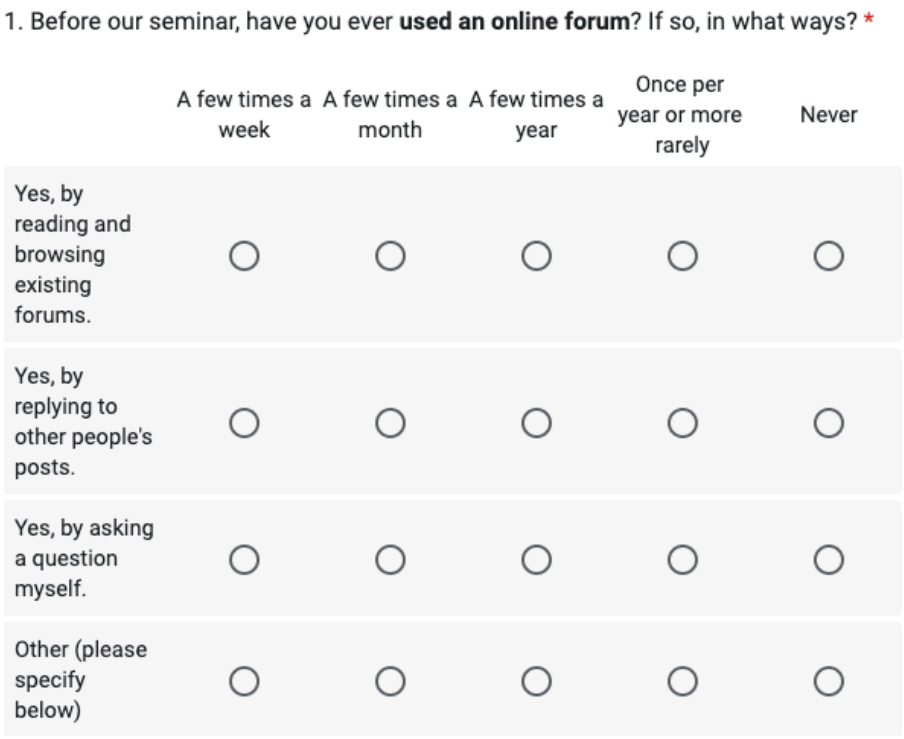


Figure 124: Revised Question 1 from Survey 3

(2) Question “2. If yes, what kind of forum was it and why have you contributed to it? (e.g. a forum about computer problems, a forum on a learning platform)” was changed to a multiple-choice question (see Figure 125):

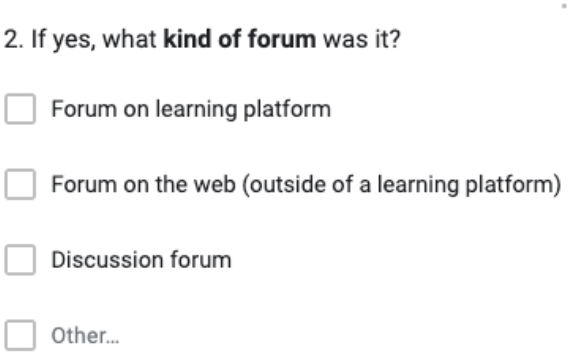


Figure 125: Revised Question 2 from Survey 3

Therein, the “Other” fields also invite respondents to add further information. Lastly, the question about forum feedback disadvantages was corrected, as it was excluded from the original survey due to a technical oversight (see section 4.5.2).

During the analysis of the final question in **Survey 4** (Course Evaluation), “Different types of digital feedback were used in this seminar. Which types did you find most useful? Please justify and explain”, it was observed that most respondents mentioned the digital feedback format which was used most recently in the seminar, presumably because it was the one they remembered best (see section 4.11.3). Therefore, this question was changed from an open response format to a response grid (matrix) in which the different digital feedback methods are listed explicitly (Figure 126).

In this seminar, different **types of digital feedback** were used. How **useful** do you consider them? *

	not at all useful	slightly useful	somewhat useful	mostly useful	highly useful	I have not received this type of feedback
Cloud editor feedback (Padlet)	○	○	○	○	○	○
Audio feedback	○	○	○	○	○	○
Screencast feedback (screen only)	○	○	○	○	○	○
Talking-head video feedback	○	○	○	○	○	○
Combination screencast feedback (screen + talking head)	○	○	○	○	○	○
Written feedback in a text editor or PDF (by instructor)	○	○	○	○	○	○
Forum feedback	○	○	○	○	○	○
Live feedback by peers in the videoconference	○	○	○	○	○	○
Live feedback by instructor in the videoconference	○	○	○	○	○	○

Figure 126: Revised Summative Question about Digital Feedback in Survey 4

The intention is to obtain a more reliable summative evaluation of all digital feedback methods in comparison to each other. Furthermore, to gain evidence or insights into their actual usefulness, the next question will ask for specific examples of use: “Have you applied or utilized the feedback that you have received? Please give concrete examples from your course work or assignments.”

In addition to these modifications in survey contents and wording, further adjustments regarding the timing, tool and scope have been made based on the present research results. In terms of timing, each of the formative questionnaires 1, 2 and 3 will be employed immediately after the peers have finished their feedback contributions on the digital boards, via recorded files or in the forums, respectively. In the 2022/23 implementation, the Christmas break and flu season in winter term led to some delays in data collection (see section 4.4). Since the TRC will be moved to summer term with the new degree program regulations (see Schluer, 2024i), a timely completion of the tasks should be feasible for everyone in the future. More precisely, the students will be asked to complete each survey within one week, if possible, after having obtained feedback from their peers. This was not always the case in the present study where some students completed survey 2 even before they had received feedback from their second peer (see section 4.4). Finally, the summative questionnaire 4 will be handed out after the last seminar session, whereupon the participants will have two weeks to complete it (due to the examination period in the week after the end of the seminar, the response time is extended). Alternatively, if time permits, participants will complete it in the final colloquium session to heighten the response rate.

Concerning the survey tool, it should be noted that the questionnaires had originally been created in SosciSurvey but had to be moved to Google Forms for the 2022/23 implementation. The reason for this change was that Google Forms offered a team function that allowed for the collaborative creation and modification of the questionnaire items. Hence, the project head and the research assistants were able to work on them simultaneously. Once the revised questionnaire drafts are completed, they can be transferred back into a more privacy-compliant application. Another important function of Google Forms, however, was that the participants could receive a copy of their answers upon survey completion. This can help students keep reflective diaries about their experiences with digital feedback methods. Generally, such a feature is also available in LimeSurvey, for example, but was not included in the university’s licensed version at the time of the research.

Finally, it should be remarked that especially questionnaire 2 (Recorded Feedback) contains (conditional) filter questions. This means that only those options will appear that the students have selected in an earlier question (i.e. Audio Feedback, Talking-Head Video Feedback, Screencast Feedback or Combination Screencast Feedback with Talking-Head). The scope of the questionnaire is thus much shorter than the previews accessible via the links in Table 65 might imply.

Table 65: Revised TRC Surveys

Revised survey	Preview link	Responder's link
Survey 1: Biographical Info & Digital Boards	https://docs.google.com/forms/d/1FD00y0qV9LvX8b7ffkqBoE3m9Bwsx9wmT5fPeH_D018/prefill	https://forms.gle/g1K4fu78gtTzGSTTA
Survey 2: Recorded Feedback	https://docs.google.com/forms/d/1yQGJLMU-JpUl8tXZVt0gOZs-QaObI7SEn_Q3FZaoxOQEA/prefill	https://forms.gle/waqSDfNnxxpch1SV8
Survey 3: Online Forums	https://docs.google.com/forms/d/18r8CeHBuG7sFov0-T9cz8f6PcKMv89yYBPe2RRUOHAc/prefill	https://forms.gle/xknNsQfny7ZqcsSG7
Survey 4: Summative Course Evaluation	https://docs.google.com/forms/d/1Cc6L_xgIh-9cREUExk8UUqs117xKLnEC9Bb6zgSRxkY/prefill	https://forms.gle/k7fzybFVmckt7VnM6

At the time of writing, all modified surveys have already been successfully deployed in subsequent research colloquia, starting with the 2023 implementation of the TRC. Overall, it is hoped that the revised surveys will likewise turn out to be useful for other research colloquia, not only in the field of TESOL, but also in additional disciplines (see section 5.6.2). Suggestions for improving the analysis of the feedback products will be sketched in the subsequent section.

5.5.2. Analysis of Feedback Products

The analysis of the feedback products in the current research turned out to be challenging due to the richness of the data, the manifold analytical dimensions and the dearth of relevant prior research. For the analysis of screencast feedback, it was possible to draw on a preceding research project (Schluer, 2021b; 2022b). However, the current analysis showed that the previously established category system was only partially useful, serving as a skeleton for inductive refinement and modification. In fact, several subcategories did not apply to the present feedback products, whereas other new categories emerged from the current coding. The likely reasons were differences in assignment types and feedback tasks, in software programs used for video production, and in the curricular embedding. This points to the complexity of factors that have an impact on the learning processes and research outcomes (see also section 5.6.2).

Similarly, it can be hypothesized that the usage of other tools for the same task will likewise result in varied category systems in future studies, e.g. with regard to the scope of functions afforded by different digital board applications or other online forums. Researchers are therefore invited to utilize the category systems established in the present study and modify them as needed. Alternatively, independently created code systems could be compared to the current ones in order to identify similarities and differences. Based on that, the validity of the measured constructs can be enhanced. In the end, there might be a large repository of possible

category systems and subdimensions that researchers can draw on to discover commonalities and discrepancies across various feedback modes and tools.

There are also more specific recommendations that can be derived from the present analyses. Given the exploratory nature of the current study, some subcategories were coded only selectively, i.e. a construct was not comprehensively coded concerning all possible subdimensions. For instance, in terms of sentence types, only questions and imperatives were coded, whereas statements were assumed as the default and left uncoded. For more valid comparisons, statements should be coded as well to see the relative distribution of all sentence types within and across the feedback messages. Likewise, all personal and possessive pronouns could be included in the category system to gain further insights, e.g. about impersonal expressions.

Depending on the pedagogical design, future research might also explore whether, for example, the incorporation of feedback requests, a purely asynchronous exchange, and a requirement to create feedback responses will affect the quantity and quality of student interactions and result in further subcategories during coding. These variations as well as the possible utilization of additional data sources and foci will be discussed next.

5.6. Suggestions for Additional Research

Moving beyond the scope of the present research, this section will suggest additional research avenues based on the integration of further data sources and pedagogical design variants.

5.6.1. Incorporating Further Data Sources

As stated by de Kleijn et al. (2013), "[f]eedback processes can be investigated from at least four perspectives: the sender's perspective, the seeker/receiver's perspective, a relational perspective (both sender and seeker/receiver) and/or an observant perspective" (p. 1014). In the present peer feedback design, the perspectives of the feedback recipients and providers were examined through online surveys. Moreover, an observer's perspective was taken through the analysis of the feedback products. Since both research methods entail limitations, future research should incorporate additional methods, e.g. by conducting stimulated recall interviews with the feedback providers regarding their feedback intentions. In the present study, the likely functions (e.g. correcting or encouraging reflections) were inferred from the feedback, which might not represent their actual intentions.

Furthermore, the perspective of the teacher was not of primary relevance in the current implementation, since the lecturer was the main researcher at the same time. Future work, however, should explore external teachers' perceptions of the suggested procedure to seek answers to the following questions: Is the procedure also feasible in their specific context? What prior knowledge do the teachers need? What if the assignment types were different from the present ones? Moreover, teachers' actual feedback practices should be studied: What feedback

strategies and digital tools do they use? How do they evaluate digital feedback methods in terms of their advantages, disadvantages, and students' learning gains? In that regard, the supervisors' feedback on the digital boards, in the videoconferences and in the text-editor should be analyzed, complemented by interviews to gain a deeper understanding. In particular, there is also a need for documenting the multimodal processes involved in the videoconference feedback, including breakout sessions, which have not been analyzed to date. The use of observation sheets, the notes tool and chat in the videoconferencing application, as well as screen-recordings could be helpful for this. Also, alternative digital methods and tools should be examined, as suggested in sections 5.7.5 and 5.7.6 below.

Moreover, the type and nature of the peer feedback comments could be compared with the feedback by the supervisor: What similarities and differences can be determined in terms of contents and interpersonal cues? In that respect, the five domains of language awareness might serve as an analytical framework: cognitive (knowledge-related), affective, social, power, and performance (James & Garrett, 1991). It can be presumed that peer feedback is characterized by lower power distance and higher social and affective bonds, whereas teacher feedback might demonstrate more extensive knowledge that could be too abstract for the students and thus harder to implement. Accordingly, future research might apply different category systems that, e.g., distinguish between feedback "aimed at *emotional support* or *task support*" (Liesa et al., 2023, p. 7; original emphasis). Possibly, the peer feedback would contain more emotional support, such as encouragement and "showing agreement" (Liesa et al., 2023, p. 8), which occurred frequently in the present study. Apart from investigating in what ways instructors' feedback differs from peer feedback, it would be interesting to explore how later posts (by teachers or peers) serve to complement, reinforce or reject previous ones (Liesa et al., 2023, p. 9). Such additional analyses could also help to refine or modify the construct definitions and sub-codes that were established inductively in the present work, thus contributing to enhancing the construct validity in the future (see section 3.11.2).

In terms of performance, data should be collected about whether and how peer feedback and teacher feedback influenced students' further learning. For this, a variety of instruments and methods can be employed, such as tests about the learning gain (e.g. in a pre-/post-test design), observational data, feedback responses, including action plans and draft revisions, as well as the final products, i.e. the Master thesis or doctoral dissertation. Additionally, the impact of AI-generated feedback throughout the research planning and academic writing process should be studied in the future (see section 5.7.6). Furthermore, informal feedback between peers (e.g. via social media or in casual conversations) is worth further examination, as this constitutes an empirical gap not only with respect to peer feedback in general (see A. S. Alharbi, 2025, p. 6; cf. section 5.3.1), but with particular regard to the supposedly solitary process of research planning and thesis writing. Ultimately, longitudinal studies need to be conducted to

investigate the impact of the different feedback sources on students' draft revisions and on the outcome of the final thesis.

Furthermore, the influence of students' heterogeneous backgrounds on the feedback, research and writing processes should be examined more closely. In the present study, the participants were highly diverse in terms of their academic socialization, their practical teaching experiences, their multilingual repertoires and linguistic abilities in the target language, their cultural backgrounds and intercultural experiences etc. (see section 4.2 and Schluer, to appear). As English constituted a foreign language for all of them, it would be valuable to investigate the effects of their L1 writing skills and feedback literacy on their L2 writing and feedback practices. A first study in this direction has been undertaken by Lu et al. (2024), which could serve as a springboard for a more detailed examination of linguistic and cultural influences on feedback seeking, feedback provision, peer feedback interactions, and feedback use.

Consequently, the following four engagement dimensions would constitute another analytical angle (see section 2.4.9): students' cognitive engagement with the feedback (e.g. processing the feedback and trying to comprehend it), their affective engagement (emotional reactions such as appreciation, anger or refusal), their social engagement (interacting with peers) as well as their behavioral engagement (e.g. follow-up actions, such as composing feedback replies, action plans or revisions) (cf. e.g. the reviews by Neupane Bastola & Hu, 2023, p. 3, and Mohammed & AL-Jaberi, 2021). For this, the "Feedback Engagement Scale" by Gan et al. (2025, p. 293) could be utilized to investigate students' engagement across the four dimensions (see section 2.4.9). Notably, also the feedback seeker and feedback user perspectives deserve a differentiated investigation (S. Chen & Nieminen, 2024, p. 706), i.e. not only the provider and receiver roles, as collected in the current study. In that regard, the items from the social engagement scale can prove useful for inquiring into the feedback seeker role, as well as a modified version of the behavioral engagement items for the feedback user role. Clearly, the engagement will also be influenced by the pedagogical design, which can be adjusted – and also co-created together with the students – in various ways, as outlined below. This would resonate with a fifth engagement dimension suggested by Reeve and Tseng (2011), i.e. agentic engagement. They defined it as "students' constructive contribution into the flow of the instruction" (p. 259), which is proactive and intentional (Reeve & Tseng, 2011, p. 265), "motivated by the desire to shape their learning experiences and positively influence the learning environment by expressing their preferences, ideas, and interests" etc. (Hınız & Çelik, 2025, p. 45). With regard to feedback processes, then, students would, for instance, voice their preferences regarding feedback modalities and tools, co-construct feedback principles and assessment criteria, or pro-actively seek additional feedback opportunities. These aspects will be considered more profoundly below (section 5.8.3).

5.6.2. Investigating the Impact of Pedagogical Design Variants

Based on what has been outlined above, the effects of different types of pedagogical design and scaffolding would be worth exploring (see also section 5.7 for further ideas): What if learners are required to initiate the feedback process, e.g. through specific feedback requests (cf. Malecka et al., 2022, p. 915; see section 5.7.2.4)? What if students are asked to complete standardized forms for feedback requests, feedback provision, and feedback responses? What if they are given explicit guidelines for using specific digital tools for feedback purposes? What if no such scaffolding is provided? What if students are free to choose their partners, and what if there is a random allocation of peers? What if students are required to respond to their peers' feedback in the same mode and thus continue the dialogue in a purely asynchronous manner (see Y. Zhao et al., 2024; cf. section 4.7.14)? What if students are given the choice to select the feedback mode, method and tool for each step of the research process (cf. Deehan et al., 2023)? What differences would be observed in anonymous vs. non-anonymous feedback designs? What influence would different types and amounts of (peer) feedback training and coaching have on the feedback process and its outcomes?

Indeed, both training before and during peer feedback processes could prove valuable (Huisman et al., 2018, p. 964) and should be studied further, given that the training can be conducted in numerous ways (cf. the review by Alqassab et al., 2023). In their review of 135 feedback interventions in higher education, Schluer and Brück-Hübner (2025) revealed a plethora of possibilities, such as training via screencast videos (e.g. Irwin, 2019), detailed guidelines and instructions (e.g. Hussain et al., 2019), intensive training phases (e.g. Okyar & Eksi, 2019) vs. offering no training at all (cf. e.g. Lei & Pramoolsook, 2020). Since written manuals and video tutorials were created after the researched TRC implementation (Schluer, 2023a, at https://tinyurl.com/DigitalFeedbackOverview), their usage, utility and impact could be investigated in the future. Another potentially influential factor on the processes and outcomes is whether the peer feedback will be graded or assessed (e.g. Colpitts & Past, 2019; Ho et al., 2020) or not (e.g. Rodas & Colombo, 2021).

Furthermore, the impact of an open feedback environment (Wood, 2019; 2021), as applied in the present study, should be studied more closely. Participants' strategies in perusing other peer's feedback and submissions occasionally transpired in the open survey responses (see especially forum feedback in section 5.1.3) or in cross-references made in their feedback (see section 4.9.9). It would be worthwhile examining the dimensions of vicarious learning and their impact systematically and more thoroughly in the future, e.g. through student interviews and screen- or eye-tracking during commenting. Also, social and affective factors are likely to play a pivotal role in that regard. Accordingly, but also more generally, the ramifications of varying student numbers and their individual backgrounds (academically, thematically, linguistically, culturally etc.), interests and interpersonal relations need closer examination. Moreover, it should be tested whether the approach would work with smaller or larger groups of participants.

What modifications of the present procedure might be necessary for larger or smaller class sizes (see section 5.7.3 for suggestions)?

While the current study was mainly conducted in online-only sessions, its approach could likewise be transferred to on-site and hybrid seminars. However, empirical insights about its feasibility and effects are still required. In view of the limited research on feedback in thesis supervision, especially at Master level and by peers, there is a general need for more studies. Since most existing works represented qualitative case studies, it would be essential to additionally perform larger-scale quantitative studies (cf. the review by Grohnert et al., 2024, p. 14, on Master thesis supervision). In particular, further evidence is needed from various disciplines and sociocultural contexts. Moreover, due to the increasing relevance of interdisciplinary research, pedagogical approaches and studies are desirable that explore thesis co-supervision by lecturers from different disciplines. As reviewed by Neupane Bastola and Hu (2023), there has been a small body of research that endorsed a "multi-voiced approach" to thesis supervision (Dysthe et al., 2006, cited in Neupane Bastola & Hu, 2023, p. 2). In fact, feedback practices could differ starkly from lecturer to lecturer and from discipline to discipline, which can result in additional challenges for the students when they try to deal with distinct commenting styles and to reconcile their (potentially contradictory) contents. For students, it might also be profitable to interact with peers from other disciplines so that transdisciplinary feedback skills can be fostered (cf. Schluer et al., 2023). These skills would be valuable for workplaces where interdisciplinary teams and transdisciplinary communication are common. For these reasons, Schluer and Meier (to appear) initiated a transdisciplinary transfer project between the humanities (TESOL) and natural sciences (biology). So far, however, the transfer mainly pertained to the didactic approach, not yet to training in transdisciplinary feedback practices or interdisciplinary co-supervision. Especially in fields that draw on multiple theoretical or methodological perspectives or require skills from different areas of expertise, interdisciplinary thesis co-supervision would be crucial, though. To avoid contradictory advice from different supervisors, a close collaboration would be needed, which in turn would require inter- and transdisciplinary skills, also among the supervisors.

In addition, students' inter- and transcultural feedback literacies and practices should be studied more intensely (see Schluer & Liu, 2024, on peer feedback in intercultural online communication). While there already was group-internal cultural heterogeneity in the present research, cross-cultural exchanges could be readily facilitated via the digital technologies that are an integral part of the course design. A collaboration between different universities focusing on similar fields of study would be precious in that respect. Consequently, students with similar thematic interests from different academic affiliations and cultural backgrounds may build peer support groups and exchange feedback on their research ideas and ongoing projects (cf. Neupane Bastola & Hu, 2023, p. 11, in section 3.4.3). This way, intercultural communicative

competences and multi-perspectivity could be developed, not only with regard to the topics, but also the teaching approaches and research methodologies.

As prior research has shown, the perception of tool affordances can vary for personal as well as cultural reasons (see e.g. the review by Schluer & Liu, 2024). Moreover, students' engagement will differ depending on their preferences and familiarity with digital media and tools (cf. Kurt & Karabulut, 2024, preprint pp. 7, 21; Laflen, 2023, p. 2). Even within one mode, e.g. written electronic feedback, feedback strategies and perceptions may vary, depending on the tool that it utilized (Laflen, 2023, pp. 2, 15). In that respect, we made the following observations in the current research: Even though Padlet enables commenting in numerous ways besides text responses, ratings and likes (e.g. audio- and screen-recording, file uploads and hyperlinking), the vast majority of comments consisted of written text only. Some included hyperlinks to websites, which were inserted only rarely, though. Similarly, forum comments were exclusively text-based in the present research, as nobody seized the upload function which would have enabled a variety of file types and feedback modes (see section 4.9.3). The reasons for (not) using certain modalities or preferring one digital feedback method over another are therefore worth further investigation. When choosing between different audio(-visual) methods in the second peer feedback phase, most students opted for audio recordings for ease of use and familiarity (see section 5.1.2). Simultaneously, though, they emphasized the affordances of screencasting in the surveys while demonstrating awareness of the limitations in recorded audio feedback. It would be interesting to explore whether the students would make the same choice again when reviewing a similar assignment type the next time, i.e. whether their current reflections on the advantages and restrictions of different digital feedback methods affect their future actions. Finally, variations in assignment type and review purpose and the suitability of specific digital feedback methods deserve further investigation.

Altogether, there appears to be a complex entanglement of individual, linguistic, socio-affective, material, pedagogical, technological and other contextual factors that requires closer examination (cf. e.g. Chong, 2022; Lipnevich & Panadero, 2021; Nieminen & Carless, 2023; Schluer & Liu, 2024). Moreover, not only digital tools, but also perceptions, attitudes, practices and skills are in a constant flux so that pedagogical feedback designs need continuous and critical re-inspection (see Schluer, 2022a, pp. 238–249, on dynamic digital feedback literacies). While the above- and below-mentioned recommendations (sections 5.6 to 5.7) are to some extent grounded in prior research and pedagogical practice, the application of these methods as part of inquiry-based learning in specific fields of research deserves deeper investigation. Educators are consequently encouraged to adapt these strategies to their concrete teaching contexts and to engage in ongoing reflective practice to refine their instructional approaches. Additionally, staying informed about current research in educational technology and related fields is essential for informed decision-making in the rapidly evolving landscape of digital pedagogy (see section 5.8 below). The next sections will therefore outline several suggestions for

teaching practice, including various adaptations of the pedagogical design and the incorporation of AI.

5.7. Suggestions for Teaching Practice

In the following subsections, various teaching suggestions will be provided to build on the insights that were gained in the current study and that emanate from recent technological developments. At the time of writing this book, some of the ideas have been implemented in subsequent semesters already. They comprise an elicitation of students' viewpoints about research in general and their own positioning in particular (section 5.7.1) as well as a systematic utilization of feedback requests and feedback responses to deepen proactive learner engagement (section 5.7.2.4). Training needs will be discussed (section 5.7.2), along with reflections about the composition and size of peer groups (section 5.7.3). Furthermore, a comprehensive set of suggestions for varying the digital feedback methods in research colloquia will be offered (sections 5.7.4 and 5.7.5). This will also include considerations about the use of AI in the research planning and academic writing process (section 5.7.6) and culminate in an integrative account of the "Cs of Education" to clarify their relevance for the TRC procedures and broader educational practices (section 5.7.7).

5.7.1. Reflective Practice about Research among Supervisors and Students

Reflective practice is a crucial aspect of professional development for supervisors, as it fosters a critical examination and improvement of their supervisory methods (cf. M. Pearson & Brew, 2002). Etymologically, *reflection* derives from the Latin word *reflectere*, meaning "'to bend back' (Valli, 1997, p. 67) or to look back and become more aware of a past event or issue" (Farrell, 2022, p. 3). In the context of teaching and other professional practices, Dewey (1910) and Schön (1983) shaped the construct substantially. Dewey (1910) regarded reflection as an "[a]ctive, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and the further conclusions to which it tends" (p. 6, emphasis omitted). As such, it is "a conscious and voluntary effort to establish belief upon a firm basis of reasons" (Dewey, 1910, p. 6). To engage in reflective thinking, noticing is an important prerequisite (Brandenburg & Jones, 2017, p. 264). Dewey (1910, p. 12) and Schön (1983, p. 308) pointed to the problems and perplexities that can prompt purposeful inquiry with the aim of suggesting solutions and improving, while Boud et al. (1985a, p. 19) posited that it can also arise from positive experiences, such as successful task completion. At any rate, an inquiry process sets in that aims to illuminate the reasons for the current state and inform future actions (Dewey, 1910, p. 9).

In short, Dewey (1910) defined reflection as a deliberate, thorough and evidence-based examination of knowledge, actions or beliefs that aims to improve established practices. As becomes clear in his five main phases of reflection, i.e. suggestion, intellectualization, guiding

idea, reasoning, and hypothesis testing, Dewey's (1910) approach thus strongly rests upon rationality and evidence. He foregrounded an inquiry-based and data-led process of reflective practice as well as the importance of transforming the derived conclusions into practice. In that respect, Dewey (1910) outlined three important conditions of reflective thinking: (1) funds of knowledge and experiences, (2) fast, flexible and fertile suggestions, (3) appropriateness and consecutiveness of the suggestions (p. 30), which are transformed into action. Moreover, Dewey (1910) delineated three characteristics of reflective individuals that remain pertinent for educators in contemporary contexts: open-mindedness, responsibility, and wholeheartedness. Open-mindedness denotes a willingness to engage with diverse perspectives and consider alternative viewpoints on issues. Responsibility encompasses the conscientious examination of the outcomes and ramifications associated with one's actions. Wholeheartedness underscores the capacity of teachers to transcend apprehensions and uncertainties, enabling them to critically assess their professional practice and effectuate improvements.

Hence, apart from cognitive processes (thought, analysis, rationality), also affective aspects need consideration (Boud et al., 1985a, pp. 21, 29). In their model, Boud et al. (1985a) consequently emphasized the role of feelings as one of "the three major elements of the reflective process itself: returning to the experience, attending to feelings, and re-evaluating the experience" (p. 21). Accordingly, they define reflection as "a generic term for those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciations" (Boud et al., 1985a, p. 19). Their model also highlights the cyclical nature of reflective practice (Farrell, 2022, p. 10). Similarly, Gibb's (1988) six-stage cycle of Description, Feelings, Evaluation, Analysis, Conclusion, Action Plan, places an emphasis on affective factors and thus extends Kolb's (1984) earlier "experiential learning cycle" of concrete experience, reflective observation, abstract conceptualization and active experimentation (as reviewed by Farrell, 2022, p. 18; Finlay, 2008, p. 8; cf. Boud et al., 1985b, p. 12). The first three phases of Gibb's (1988) cycle focus on the experienced situation, while the final three phases are devoted to improving it (Cambridge International Education Teaching and Learning Team, n.d.).

M. Pearson and Brew (2002) advocate for this practice, suggesting that supervisors engage in self-reflection to enhance their mentoring strategies (p. 143). An initial step in this process involves supervisors reflecting on their conceptions of research (and feedback) practices to lay a foundation for critically questioning their preferred methodologies (M. Pearson & Brew, 2002, p. 143). Likewise, the very notion of "research" itself is subject to varying interpretations. Therefore, it would be worthwhile to inquire into supervisors' and students' beliefs about it. For illustration, M. Pearson and Brew (2002, p. 144) cite four conceptions of research, the domino conception (research "as a process of synthesising separate elements"), the layer conception (research "as a process of discovering, uncovering or creating underlying meanings"), the trading conception (research "as a kind of marketplace where the exchange of products takes

place"), and the journey conception (research "as a personal journey of discovery"). The latter appears to be quite prominent in my own supervision practices.

To uncover students' conceptualizations and determine how they might differ from my own understanding, I began to use a picture card activity in the first session of the TRC from 2023 onwards. I searched the web for an array of pictures and uploaded the collage into the videoconferencing app. Via the interactive whiteboard tools (similarly applied in the on-site class), students marked a picture that in their point of view best illustrated their current status (in the research process) and their feelings, given that they had gained various experiences with research already. The resultant discussions were illuminating and also served as an ice-breaker and warm-up at the beginning of the seminar. Future research might examine these perceptions more closely by adopting a similar activity or a "rich picture approach" following Balloo et al. (2024, as adapted from Bell, Berg, & Morse, 2016). In the rich picture method, "participants creat[e] visual and symbolic representations of their lived experiences using pens and paper" (Balloo et al., 2024, p. 469). Balloo et al. (2024) applied this procedure to uncover students' perceptions of "feedback", but it could likewise be utilized to disclose their conceptualizations of "research" (see also the language silhouettes by Martin, 2012).

Alternatively, questions could be posed as prompts for reflection (adapted from Kunkel & Gilliland, 2023, pp. 42–43):

- "How do you feel when hearing the word 'research'/ How do you react to the word 'research'? When I hear/see the word research, I …"
- "How would you define "research"? To me, research means …"
- "What are your views about teachers doing research?"
- "In your opinion, what are the advantages and disadvantages of being a teacher researcher?"

These questions can be revisited or repeated at the end of the seminar to detect possible changes in views and attitudes (e.g. as pre- and post-surveys or reflections).

Apart from openly discussing underlying conceptualizations of the research process together with the students, teachers should also elicit thesis writers' opinions and experiences with feedback at the beginning of the seminar and allocate sufficient time for feedback training and coaching throughout the research (planning) process. In the current study, two major aspects stood out as critical, i.e. adequate scaffolding for proactive learner engagement in the feedback process as well as socio-affective considerations for effective peer support. These two dimensions will be addressed in the next two sections.

5.7.2. Feedback Training and Pedagogical Scaffolding

Participants in the current study occasionally deplored the quality of the peer feedback they received (see e.g. section 5.2), which could have resulted from lacking experience in feedback

provision, unfamiliarity with dialogic feedback including their own proactive role in all phases of the feedback process (cf. section 2.2), dependence or overreliance on teacher feedback as well as inappropriate feedback strategies and technological choices. Consequently, teachers should devote more time to an extensive feedback training (cf. participant voices in J. Chen & Bogachenko, 2023, p. 9944) as well as ongoing coaching, starting with an elicitation of students' understanding of and prior experiences with feedback. To overcome these challenges, the following subsections 5.7.2.1 to 5.7.2.4 will discuss different facets of feedback training and pedagogical scaffolding based on the insights that were gained from the present study.

5.7.2.1. Awareness-Raising of Roles and Responsibilities in the Feedback Process

Similar to inquiring into students' and supervisors' understanding of research (see section 5.7.1), it is necessary to clarify participants' understanding of the 'feedback' construct at the outset of each pedagogical intervention, which also involves a negotiation of roles and responsibilities at all stages of the feedback process. According to Brück-Hübner (2024, pp. 102–103), these comprise (1) the initiation (who starts the feedback process?), (2) communication (who communicates feedback to whom, how and when?), (3) reflection and (re-)construction (how do I understand the feedback and what could I do to understand it better, e.g. by engaging into further feedback dialogues?) as well as (4) transfer of feedback (how will I implement the feedback?). For all phases, students' and instructors' roles and responsibilities should be negotiated, which presupposes mutual trust and possibly also a shift in mindset. While students might expect teachers to be the typical providers of corrective feedback, instructors frequently consider themselves as the designers of feedback processes (cf. section 2.2). However, even pedagogical decisions about the feedback directions, modes and tools could be established collaboratively by learners and teachers alike, thus involving and empowering students to a greater extent (see participatory and co-creation approaches in section 5.8.3). For instance, they could discuss the benefits and challenges of conducting anonymous or open reviews (see e.g. Rath, 2025, p. 7; Y. Zhang et al., 2024, p. 8), try out both variants and decide on the approach that might be most suitable for a particular feedback task. It would therefore be recommended to raise students' awareness of the options that exist (see e.g. the review article by Schluer & Brück-Hübner, 2025, as well as the feedback taxonomy by Schluer, 2024d; 2024g) and to enter into dialogue with the learners to gradually develop the required confidence and feedback skills.

Learners might be particularly insecure about the value and usefulness of peer feedback as well as their own abilities in providing helpful comments (cf. affective dimension summarized in Schluer, 2022a, p. 39, and section 2.3.2). In that regard, teachers could raise students' awareness of the different types of feedback that exist, such as emotional support vs. task support (Liesa et al., 2023, p. 7), as well as the differences between problem detection and problem-solving (Y. Zhang et al., 2024, pp. 7–8). In other words, in some cases, it might already be helpful for the recipients if their peers identify a problem in their draft, even without

suggesting a solution for this problem (cf. Flower et al., 1986, in section 2.3.2, as well as Wu & Schunn, 2023, cited in Y. Zhang et al., 2024, pp. 7–8). This could reduce the pressure students feel when asked to provide feedback, which they often see as requiring high expertise in order to offer adequate corrections and advice. Awareness of these different skills in error detection and feedback provision may not only lead to higher engagement and confidence boosts on the providers' side, but could also increase recipients' understanding of the comments' value and the additional steps that they need to take to solve the problem that their peers identified. Thus, on the attitudinal level, peers could develop more positive perceptions of the comments they obtained, even if they did not contain actionable recommendations. Generally, producing actionable comments means that they can be implemented in revisions, i.e. feedback that does not solely consist of praise, summaries or error detection, but includes clear, correct and constructive advice for improvement (Y. Zhang et al., 2024, p. 4).

On the linguistic level, the categories that were derived from the qualitative analyses of the peer feedback artifacts in the current study can likewise serve as a foundation for training, also to collaboratively set up guidelines for feedback provision (see e.g. Rath, 2025, p. 3, on the usefulness of exemplars "to clarify expectations and provide a model for quality contributions"). These involve linguistic, notably pragmatic, aspects such as a conscious choice of sentence types (e.g. questions or imperatives), pronoun use (I, you, we perspectives) as well as the utilization of hedges and boosters. Moreover, non-verbal aspects and their interplay with verbal ones are crucial. For example, students should be aware of the options that exist in written modes (e.g. capitalization, bold font, italics) and the possible constraints that specific tools could entail. Furthermore, the pros and cons of using abbreviations should be discussed (e.g. to show familiarity with a topic or to position themselves on a peer level). Especially those applications which allow for multiple modalities deserve special attention in feedback training, as the current research has shown.

Analogously, the other analytical dimensions and data samples could be implemented in feedback training. Furthermore, students could engage in peer coaching by seizing their various levels of expertise along the different dimensions of heterogeneity (see section 4.2). Additional facilitation strategies by teachers will be discussed next.

5.7.2.2. Teachers' Facilitation Strategies

Teachers play a critical role in facilitating peer feedback processes (Mansour, 2024, p. 15978; Schaefer et al., 2019, p. 1354; Tawalbeh & Al-Husban, 2023, p. 510; Tseng & Er, 2024, p. 133; Xie & Correia, 2024, p. 72), especially when they are implemented for the first time in a course. Firstly, instructors should encourage students to participate actively, alleviating their concerns and building their confidence in posting peer comments, whilst also acknowledging the contributions that have already been made as well as prompting deeper reflection. For example, they might ask students to expand on the points they have mentioned (facilitator cited in Mansour,

2024, p. 15985), thus modelling expansion and questioning for clarification strategies to the learners. Moreover, they can prompt critical thinking by asking students to evaluate existing posts and engage with different perspectives (Xie & Correia, 2024, p. 80, with reference to Kwon et al., 2019; cf. Rath, 2025, p. 7). In that regard, teachers may provide tailored scaffolding or "structured prompts" to foster student engagement (Rath, 2025, p. 7). As a student in Mansour's (2024) remarked, "[t]hey helped us build on each other's contributions and our own views and understanding […] and created a collaborative atmosphere where every one's voice was valued" (p. 15979). In that regard, open-ended questions, paired with the possibility for peer discussions in small groups, but also individual feedback on the feedback could prove useful (see review by Xie & Correia, 2024, p. 83). The concrete facilitation techniques are likely to vary with the task, feedback objective and learner group (cf. Mansour, 2024, p. 15985), which thus necessitates a comprehensive and agile set of facilitation practices from the teachers (cf. Tawalbeh & Al-Husban, 2023, p. 510; Xie & Correia, 2024, p. 72).

In particular, the amount and type of facilitation should be considered with caution, as students might be inclined to wait for and rely on teachers' feedback instead of contributing in-depth feedback themselves (cf. Xie & Correia, 2024, p. 78). Generally, instructors' presence and participation in peer feedback can influence both the quantity and quality of students' contributions, their emotions, learning time and achievements, as Xie and Correia's (2024, p. 81) review of asynchronous online discussions has revealed. Overall, though, mixed findings were obtained from the studies, "including positive, neutral and adverse effects" (Xie & Correia, 2024, p. 81). More research is therefore needed on instructional designs (Tseng & Er, 2024, p. 134), the "optimal level of instructor presence" (Tawalbeh & Al-Husban, 2023, p. 511), types of facilitation strategies and their impact on student participation and performance (Xie & Correia, 2024, p. 84). Possibly, also making peer feedback "count for a small portion of students' final marks" (Steenkamp & Brink, 2024, p. 7) might help. However, this external motivation is presumably hardly efficient, especially if students do not recognize the benefits of peer feedback, lack confidence in commenting and simply fulfill the task because it is a requirement (see student comment by S005 in the present study). Intrinsic motivation encouraged by an adequate pedagogical design, trust-building, training and continued support are therefore pivotal.

While technological options abound in today's digitalized world, the focus of any teaching design should derive from "the pedagogical needs rather than the technology itself" (L. Li, 2023, p. 290). While numerous digital feedback methods and tools have been explored and researched over the past years (see e.g. Schluer, 2022a), teachers and scholars have only recently begun to examine "the role of instructional design in facilitating dialogic peer feedback practices" (Tseng & Er, 2024, p. 134). Notably, this concerns students' low engagement in providing comments, reading, replying and acting on them (cf. review by Tseng & Er, 2024, p. 134). To promote student engagement in dialogic feedback practices, Tseng and Er (2024) therefore proposed "a *regulated* dialogic feedback approach" (p. 134; original emphasis). Student support

was provided via an online feedback platform over three phases (Tseng & Er, 2024, p. 135). First, students assessed their own work against a given rubric, compared it to their peers' self-assessments and then negotiated quality criteria as well as feedback procedures as part of a "shared regulation of learning" (SSRL) (Tseng & Er, 2024, p. 135). Second, during the "co-regulation of learning (CoRL)" phase (p. 135), the actual peer feedback exchange occurred by taking notes, sharing comments and posting replies (p. 143). To facilitate engagement and action planning, peers can define specific actions related to particular feedback comments, assess the difficulties involved, structure the steps into manageable units (p. 143) and set a deadline for their completion (p. 137). Third, students incorporate the revisions and evaluate their progress in the so-called "Self-Regulation of Learning (SRL)" phase (Tseng & Er, 2024, p. 134). On the feedback platform, they can continuously update and track their progress, supported by a visualized overview (Tseng & Er, 2024, p. 138).

While such a structured digital feedback platform can certainly be advantageous, the social and interpersonal dimensions must not be neglected. Research has demonstrated that instructors' social presence has an impact on the ways in which peer feedback processes take place (Xie & Correia, 2024, p. 72). However, as each technology and tool restrains or fosters interactions in different ways, tool-specific considerations become crucial from a sociomaterial lens (see section 2.1). Based on the current findings, the next section will therefore outline some recommendations for student participation using distinct digital feedback methods and tools.

5.7.2.3. Tool-Specific Feedback Training

In the present study, it was found that not only general feedback training is essential, but also specific training in different feedback modalities, as well as sufficient opportunities for regular feedback exchanges (cf. J. Chen & Bogachenko, 2023, pp. 9944, 9950). In that respect, the goal of the TESOL Research Colloquium was to synergistically combine asynchronous and synchronous methods as well as different feedback directions (teacher-to-student, student-peer feedback, student-to-teacher feedback) to support students at successive stages of the research process. Based on the present analyses, the following tool-specific recommendations can be derived.

With regard to **digital boards**, we observed that Padlet offers a variety of features and settings, including the design of the Padlet (e.g. "wall", "grid" or "canvas"), the (in-)ability to move posts freely as well as to use a like/rate function. Generally, it seems advisable for the Padlet authors to create several initial posts that others can directly comment on. This way, the feedback will be immediately attached to the referred post (rather than anywhere on the Padlet), thus facilitating localization and enhancing clarity. Putting posts into a tabular structure can be helpful if several distinct and unconnected topic ideas are put forward, whereas a more flexible structure would be more suitable for one interconnected topic (see video tutorial by Schluer,

2024k). It is hence important to go beyond an introduction of the “basic functions of the digital board to perform assigned tasks” (Chaikovska, 2023, cited in Rudenko et al., 2024, p. 331).

Furthermore, the utilization of the like/rate function on digital boards should be encouraged, as it is not only inviting as a starting point for additional commenting but also fosters participation by students who might not be able to provide detailed or actionable feedback (see e.g. distinction between error detection and problem-solving in section 5.7.2.1; Y. Zhang et al., 2024, pp. 7–8). Rating or voting results are also useful for the feedback recipients to identify possible peer tendencies, for example whether a certain idea is favored over another. Likewise, the feedback recipients but also the remaining peer reviewers can use the voting function to prioritize the most valuable or relevant comments. This, in turn, might serve as a springboard for more detailed action planning and the implementation of the feedback. Similarly, feedback seekers could resort to the polling function of digital boards to obtain a quick overview of opinions (University of Miami, 2025, n.p.; see section 2.6.3).

Additionally, anonymous commenting on digital boards can also be helpful for students who struggle with giving honest negative feedback for interpersonal reasons (cf. Rath, 2025, p. 7; Y. Zhang et al., 2024, p. 8). On the other hand, anonymous reviews might discourage further communication between the peers. As suggested above, teachers should discuss the strengths and limitations of both options with the students, possibly also leaving space for individual variation, e.g. depending on students’ familiarity with a particular topic (e.g. non-anonymous feedback if students feel familiar with a topic or method and would like to engage in follow-up dialogues).

Compared to other digital methods, notably recorded feedback but also forums, the digital boards rather seemed to encourage quick and short feedback, which could remain superficial, as stated in survey 1 (section 4.3.3.2). In that regard, it was observed that the participants did not seize the multimodal commenting options, even though voice and video recording would have been possible on Padlet in addition to text comments and hyperlinks. A simple way to exploit visual enhancement features on digital boards would be the coloring of posts. For instance, peers could cluster related ideas by using the same color (cf. Beal & Hontvedt, 2023, p. 13). Alternatively, feedback recipients may color posts to mark their relevance or progress in implementing them.

Subsequent to the analysis, a Padlet function was detected which might encourage more interactions on the boards: Students should activate the “follow” function to be notified when a new comment has been added to their board. They can determine the settings for their notifications (push notifications or via e-mail) in the Padlet options. Moreover, they can access the Padlet feed to view the post history of all comments. Another new function that was introduced in February 2023 is the slide show view of the Padlet. Whether this is of any use for the Padlet authors or feedback providers remains to be explored.

As regards **recorded feedback**, the analysis helped to identify additional suggestions. For both audio- and screencast feedback, it might make sense for feedback providers to take notes of the most important points they want to mention as well as to develop a short structure for the recording in advance (Schluer, 2022a, p. 198). Moreover, it would be helpful to summarize the feedback at the end and mention the most important issues to ease understanding for the recipient (Schluer, 2021b, p. 166). Additional considerations for the creation of screencast feedback are as follows: Before starting the recording, it would be reasonable to mark relevant parts of the assignment that is being reviewed. Furthermore, comments could be added in the document itself (Schluer, 2022a, pp. 198–199). These might serve as anchor points not only for the providers but also recipients when creating or watching the video, respectively. During the recording, the affordances of screencasting should be exploited, e.g. by highlighting the corresponding parts with the cursor or by pointing at relevant passages while talking about them. The underutilization of these visual enhancement features has been deplored by the participants in the current study, even though they can be integrated relatively easily during the screen-recording (cf. Schluer, 2021b, pp. 168–169; 2022a, pp. 198–199). After the recording, it is optional to engage in video editing (Schluer, 2020a, p. 10; 2022a, pp. 201–203). For the recipient at least, it might be helpful if the video includes chapter sections (e.g. “Form”, “Content”, “Language”) that ease the navigation and localization of specific passages (cf. Schluer, 2022a, p. 22). Finally, the inclination to give corrective comments in screencast feedback deserves critical consideration (see section 4.8.3), particularly since the manifold visual and auditory strategies could likewise be utilized to provide positive feedback.

Concerning **online forums**, the analysis led to the following recommendations: First, the use of bullet points, enumerations, or bold font can help to structure the feedback and make it more accessible for the recipients. Teachers and students might also agree on a review template to facilitate the commenting and reception processes in forums. Furthermore, reviewers could copy and paste relevant parts from the presentation when commenting on them, so the feedback receiver will know exactly what the feedback-providing peer is referring to. Students should also consider adding helpful links or illustrations to their forum entries, possibly voice or video recordings if needed. In that regard, the upload function of online forums can be exploited if a direct insertion of multimodal elements is impaired by the forum application. Similar to Padlet, it is also recommended to subscribe to a forum to be notified about new comments and author replies. This may facilitate and accelerate dialogic feedback exchanges. To start with, the rating of peer contributions in the forum with a “thumbs up” can be a simple way to show acknowledgment for their efforts. Additionally, follow-up questions (e.g. for clarification) can be posed, and supplementary information could be offered when requested by the reviewers. Likewise, teachers could show their presence and attention by acknowledging the first forum entries, encouraging further interactions as well as wrapping up longer discussion threads (Association of College and University Educators [ACUE], 2020). The depth of student

engagement might be enhanced further through a systematic incorporation of feedback requests and responses, as will be suggested below.

5.7.2.4. Systematic Incorporation of Feedback Requests and Responses

Much prior research has been framed by a sender-receiver paradigm of feedback transmission (see Carless, 2022, and the review by Schluer, 2022a, p. 16). Contemporary conceptualizations, however, foreground the importance of proactive learner engagement at all stages of the feedback process, not just during the provision and implementation of the feedback comments (e.g. Brück-Hübner, 2024; Carless & Boud, 2018; Malecka et al., 2022; see section 2.2). Therefore, the TRC design could be further improved by incorporating self-reflection and feedback requests at each step of the research process so that students can proactively initiate feedback dialogues with their peers.

Although students primarily provided specific feedback in the present study, the alignment of feedback with learners' needs could be enhanced further through the feedback seeker's formulation of concrete questions. "Feedback Requests" are essential for self-reflection and for seeking feedback proactively (Winstone & Carless, 2020, pp. 108, 110; Schluer, 2022a, pp. 37, 42–43). Teachers might scaffold this process through guiding questions, such as the following (see Schluer, 2024i, p. 45; cf. Bloxham & Campbell, 2010, cited by Malecka et al., 2022, p. 915):

(1) What aspects of your assignment do you consider strongest? OR: What are the areas you feel confident about in your assignment?
(2) What aspects of your assignment do you think need improvement? OR: What are the areas you are unsure of in your assignment?
(3) For which (approximately three) specific aspects would you like to receive feedback from your peer? Formulate a "Feedback Request" by naming these aspects.

In prior work, these feedback requests were typically submitted together with the assignment, e.g. on the cover sheet (Malecka et al., 2022, p. 915; Winstone & Carless, 2020, pp. 108, 110; cf. de Kleijn, 2021, cited by Frattarola et al., 2024, p. 10; see also student in F. Hyland & Hyland, 2001, p. 202). However, in other modes and media, they might be pasted onto a sticky note on a digital board or recorded as audio or video files, for instance. To facilitate the process for the students, I provided concrete examples for different stages of the research and academic writing process in later TRC implementations (examples cited in Schluer, 2024i, p. 57):

- *"I am interested in two different topics and don't know which one to choose. I have listed several pros and cons on the digital board and would be grateful for your suggestions. Which one do you think is most feasible and relevant and why?"*
- *"In my research, I focus on XY and have already started to write the literature part. However, I am not sure about the most fitting structure or whether I forgot an important term*

in my table of contents. Could you please look at sections 2.1 to 2.4 of my table of contents (see upload)? What do you think?"

- *"I have piloted my survey already and noticed that the responses for the open questions went into a totally different direction than the one that I had intended. So, I assume that maybe the formulation of my questions was not clear enough, or that a different data collection format would have been more suitable (e.g. closed questions or interview)? Can you please look at questions 4 + 5 of my uploaded draft and the three sample responses that I have received? Thank you!"*

Subsequently, the fellow students read the submissions and communicate their feedback. In that regard, they may likewise point to open questions or challenges that extend beyond the feedback seeker's specific request. Moreover, peers might need additional guidance in feedback provision, depending on their familiarity with review procedures and the technological tools. In that respect, the teacher (or more experienced peers) can offer scaffolding and coaching as required or requested. Although most feedback contents in the current analyses incorporated specific recommendations, it might be necessary to guide students more explicitly in the formulation of feedback comments. Notably, they should be "encouraged to […] include explanatory information and constructive suggestions to solve the identified problems in order to positively influence feedback implementation" (Wu & Schunn, 2021, pp. 386–387; see section 2.3.3). Hence, they should not only specify the aspects that they would change, but also why they would change them (Gielen & De Weaver 2015, cited in Wu & Schunn, 2021, p. 387). In that regard, they could report on their own experience and share their ideas about possible solutions. These might be formulated indirectly as hints or suggestions to encourage their peers' independent thinking. Furthermore, they could mention references or resources that they deem useful. A helpful strategy for the feedback providers would be to take the perspective of the feedback recipient (see Schluer, 2024i, p. 57): What kind of feedback would I expect or desire? How should it be formulated? Would some encouragement and constructive criticism help me improve? In that respect, students should be reminded to not only concentrate on areas for improvement, but to also identify the strengths of their peers' work (cf. Schluer, 2024i, p. 57).

At the same time, it should be emphasized that it is not necessary for the feedback-providing students to comment on all aspects that their peers desire (Schluer, 2024i, p. 57). They cannot provide expert opinions on everything, as each student has different funds of knowledge, backgrounds, interests, and resources available (see heterogeneity dimensions in section 4.2 and Figure 6). Nonetheless, peers usually find it very helpful to receive supportive as well as critical comments from someone who is currently in or has recently experienced a similar situation (Schluer, 2024i, p. 57). This can reduce potential pressures and anxieties towards peer feedback on both sides.

After the feedback exchange, the students should engage with the peer comments and compare them with their initial self-assessment. Instead of directly starting with a revision, the

dialogic nature of the peer feedback process can be further enhanced by creating a "Feedback Response" (Schluer, 2024i, pp. 45–46). This can be any follow-up (inter-)action in which the feedback recipients engage with the comments, e.g. by seeking or providing further clarification. Some students did this automatically in the researched TRC implementation, as was seen in the so-called "author responses" (see sections 4.7.13, 4.8.10 and 4.9.11). However, they occurred relatively rarely and were often rather brief, mostly consisting of an expression of thanks. To encourage deeper processing of the feedback, the recipients could be asked to complete a "change tracker sheet" (see Gießler, 2024) or "feedback tracker sheet" (Schluer, 2024j, p. 301; cf. Schluer & Maschke, 2025) or write some kind of "rebuttal letter" (Malecka et al., 2022, p. 917). In these sheets or documents, they note down the comments and explain whether (or in how far) and why they accepted or rejected them (Malecka et al., 2022, p. 917). To scaffold the procedure, instructors could offer guiding questions for reflection and illustration (cf. Schluer, 2024i, pp. 45–46):

(1) What aspects of your assignment did your peer find particularly successful, and why?
(2) What specific suggestions or recommendations for improvement did your peer provide?
(3) How do your peer's comments align with your self-assessment and "Feedback Request"? In what ways do they differ?
(4) In how far do you find the peer feedback useful (or not)? Was there anything that was hard to understand or that you would like to clarify further? Please let your peer know. You can write or record a "Feedback Response" or talk to your peer (e.g. in the next session).
(5) How will you use the feedback? Create a concrete action plan and begin to implement it.

Encouraging students to comment on feedback is vital to avoid or reduce potential misunderstandings and misinterpretations of the feedback messages (Bitchener et al., 2010; Chanock, 2000; both cited by Saeed et al., 2021, p. 11). Commenting allows students to seek clarifications, address writing issues, defend their ideas, and learn how to productively negotiate criticisms (as reviewed by Saeed et al., 2021, p. 11). In the "Feedback Response", the recipients should likewise change perspective: What kind of reply would I expect or desire? In what ways should it be formulated? Generally, it seems adequate to start with a thanks, followed by a description of how they are going to use the feedback. Furthermore, they should specify the open questions that persist by asking their fellow students for elaboration and clarification. This can be done in the same mode or via the same digital tool as before or in a synchronous follow-up dialogue.

As any feedback conversation (be it asynchronous or synchronous) constitutes an interpersonal exchange, socio-affective aspects become crucial, to which we will turn next.

5.7.3. Socio-Affective Aspects and Adaptations for Large Classes

The present section will address socio-affective aspects and potential adaptations for peer feedback in larger classes.

In the analyzed implementation, the number of students was comparatively high, with N=22 participants in total, of which N=12-14 contributed regularly and participated in the research. This high number had an impact on the workload for the individual students, especially at the beginning and end of the course where everyone was asked to give each other feedback. Also, receiving a high number of comments in an unstructured manner could cause overload among the recipients (e.g. S006 in section 4.5.3.3; Cui & Schunn, 2024, p. 10, concerning peer feedback, and Torres & Satti, 2024, p. 40, regarding online forums). In larger classes, it would therefore be advisable to form "Peer Support Groups" throughout all phases, not just for the intermediate step of exchanging digitally recorded feedback on the work plan and table of contents (see also Schluer, to appear). These could be permanent peer groups or shifting peer constellations, depending on the students' areas of expertise. For example, students with similar thematic interests might work together in the phases of setting a focus and determining relevant literature (steps 1 and 2). Next, to elevate the pedagogical planning of a classroom intervention (step 3), more experienced student teachers could provide feedback. Likewise, students with experience in qualitative and/or quantitative research may offer support to those who wish to apply a similar research design. Finally, for feedback on the project presentations (step 4), student peers with similar topics might exchange feedback with each other, and/ or doctoral students could assist Master students based on their own experience in writing a Master thesis. That way, participants' heterogeneity (see section 4.2) could be seized as an asset in various ways in the research planning process.

However, a drawback of non-permanent peer groups is that students may need to repeatedly explain their research plans, and peers will have to familiarize themselves with new topics every few weeks (cf. Kunkel & Gilliland, 2023, p. 23). On the other hand, permanent peer groups might lead to limited perspectivity so that students miss the opportunity to benefit from multiple peer reviews at each stage of the research process. In fact, receiving feedback from several peers offers significant advantages, both quantitatively and qualitatively (K. Cho & MacArthur, 2010). Multiple peers can identify more issues in a student's assignment, resulting in a more comprehensive review that minimizes errors and omissions (Miyake, 1986, quoted in K. Cho & MacArthur, 2010, p. 330). Additionally, diverse comments from various peers can enhance students' audience awareness and monitoring skills (Schriver, 1990, cited in K. Cho & MacArthur, 2010, pp. 330, 335; cf. Brereton & Dunne, 2016, p. 29408). Hence, different readers provide "multiple perspectives" and "multiple opportunities for scaffolding" (Nicol, 2010, p. 510). On the downside, this could also be overwhelming for the feedback recipients (see e.g. comment by S012 in section 4.11.2; cf. Cui & Schunn, 2024, p. 10, in section 2.3.2), thus requiring further guidance or a reduction of the number of feedback-providing peers.

Moreover, trust in the feedback typically increases when several reviewers highlight similar points, which thus creates the impression of collective consensus (DiPardo & Freedman, 1988, cited in K. Cho & MacArthur, 2010, p. 330) and a sense of assurance (Lee, 2015, quoted in C. Y. Chang, 2016, p. 97). Similar or convergent comments usually point to genuine issues that need further inspection, whereas varied feedback on the same aspect may reveal an existing vagueness in the research or wording which causes differing interpretations (cf. Nicol, 2010, p. 510). Furthermore, K. Cho and MacArthur (2010) found that the feedback from multiple peers had a greater impact on meaning-level changes, such as clarifications or elaborations, rather than on surface-level changes like spelling or punctuation (pp. 333–334). Yet, as observed in the present research, comments might remain on a surface-level if students do not (feel to) have sufficient subject-matter expertise or if they feel overburdened by providing feedback to a large number of peers. It might therefore be "advisable to divide students into small discussion groups to enable more effective participation" (Xie & Correia, 2024, p. 87; cf. Mudau & van den Berg, 2023, p. 12). Affective aspects in the feedback process thus warrant special attention, particularly in terms of trust-building in others' comments but also confidence-building in one's own capabilities.

One major advantage of permanent peer groups is that trust-building can be facilitated. As researchers have repeatedly highlighted, "[b]uilding trust in a group seems to be an essential prerequisite for effective peer assessment" (McConlogue, 2015, p. 1504). Through regular trust-building activities, then, successful peer review could also be achieved in larger groups, leading to diversified perspectives. To create a supportive atmosphere, "[s]tudents should have the opportunity to work in small groups early on and frequently" (Blair & McGinty, 2013, p. 473). Hence, preparatory steps for trust-building should already be taken before the actual feedback activities begin. This step is often overseen, but could be accomplished through warm-up activities at course start (see e.g. sections 5.7.1 and 5.7.4) as well as through work in small groups on course topics that are of relevance for all participants. Generally, there is thus a need to incorporate "community-based" (Gao & Chen, 2025, p. 22) and "affectively-oriented peer feedback training" (p. 38), not just training about the feedback contents, structures, styles, and technologies.

In fact, emotion management is critical not only in the feedback process, but also throughout the research and IBL process. Planning and conducting research are frequently characterized by unforeseen developments (e.g. facing challenges in participant recruitment, handling large amounts of data, being confronted with conflicting views and criticism), often leading to emotional challenges, especially for novice researchers. In that respect, students need to learn to "recognize that messiness and uncertainty are normal parts of the research process" (Kunkel & Gilliland, 2023, p. 27), requiring tolerance for ambiguity and self-efficacy. Accordingly, Gess et al. (2017) emphasized three affective-motivational skills, which are (1) research-related self-efficacy beliefs, (2) intrinsic motivation or interest in research, and (3)

tolerance for uncertainty in the research process (p. 83, building on Baumert and Kunter's [2006] concept of teachers' professional competence). Self-efficacy beliefs refer to an individual's subjective conviction in their own abilities to successfully complete specific tasks — even under challenging conditions (Gess et al., 2017, p. 84). Tolerance for uncertainty describes the tendency to consider ambiguous situations and contradictory findings as opportunities in a positive sense, motivating them to engage constructively with these uncertainties (p. 85). A prerequisite for dealing with uncertainties is a research-oriented mindset (Fichten, 2017, p. 156), which can be built through a systematic integration of IBL into higher education.

Moreover, it is essential to foster communication skills among students so that they are empowered to defend their research and engage with criticism constructively, but also to find support and synergies within their communities of practice. Hence, students should learn to communicate effectively not only with their supervisors, but also within peer groups or research teams as well as the wider academic community (Gess et al., 2017, p. 85). Therefore, supervisors could go beyond providing subject-specific feedback by additionally offering suggestions for improving communication throughout the research process (Gess et al., 2017, pp. 85–86). In that regard, students should also acquire skills in seeking assistance, accepting guidance and engaging with criticism, as well as in supporting their own standpoint, ideas and research through convincing, evidence-based arguments (cf. Gess et al., 2017, p. 85).

Overall, the peer group approach pursued in the present study aligns with the concept of "Inquiry Communities" (Cochran-Smith & Lytle, 1999) or "Critical Friends Groups" (Costa & Kallick, 1993, cited in Kunkel & Gilliland, 2023, p. 23), which could even be maintained after the research colloquium and possibly after graduation (see Kunkel & Gilliland, 2023, p. 37; cf. also Woodrow, 2020, p. 6, on this idea of peer groups "to discuss aspects of the dissertation research and writing"). As for the research colloquium, it probably makes sense to start with multiple peer feedback at the initial phase of topic identification, before forming special interest groups in later rounds. This way, it can be ensured that everyone has gained some basic knowledge about everyone's topic, before setting up peer groups with a selected number of fellow students. Moreover, learners might be free to move to other groups at later stages if they feel that there is a greater match of interests and expertise. Generally, for effective peer feedback, it is important that students perceive their level of knowledge as sufficient (cf. e.g. Flück & Junge, 2016, p. 207).

In total, though, it would be recommended to specify a minimum amount of peer reviews for each phase, with the option to offer feedback to additional peers as desired (cf. A. S.-J. Lee & Ho, 2021, p. 126, for cloud editor feedback; see also Cui & Schunn, 2024, p. 7). This could also help to reduce students' workload while increasing their motivation, as had been criticized by some participants in the current study (e.g. S005). Intrinsically motivated students perform a task because they are interested in it and recognize its value for improving their learning (cf. Biggs & Tang, 2011, p. 36). By contrast, extrinsic motivation, as purported by S005, leads to

rather small benefits for the feedback recipients and for the possible resultant learning gain (cf. Biggs & Tang, 2011, p. 35). Fostering a peer mindset of balanced giving and taking with reciprocal benefit could be conducive in that respect (cf. Johnson & Johnson, 1993).

Students' motivation and engagement can possibly be further strengthened through the joint creation of assessment criteria and feedback guidelines within the peer groups (cf. e.g. Schluer, accepted; Schwarz et al., 2016, p. 167; see also section 5.8.3). This participatory approach allows students to actively engage in the evaluation process from the outset. It not only fosters their understanding of the standards and expectations but also promotes critical thinking and confidence (cf. Bearman & Ajjawi, 2018, p. 7; H. Zhao & Zhao, 2023, p. 768). For instance, students could collectively develop a rubric for assessing research proposals, considering aspects such as originality, methodology, and clarity of presentation (cf. Chan & Chen, 2023, pp. 1406–1407, and Meer & Chapman, 2014, pp. 1–2, on co-creation of assessment design and criteria; see the general review by Smith et al., 2024, p. 5). Moreover, they can collaboratively establish feedback guidelines to ensure that the feedback is balanced and constructive while meeting their needs. These collaborative efforts can help students internalize the characteristics of high-quality work (cf. Bearman & Ajjawi, 2018, p. 7), making them better equipped to produce their own assignments and provide meaningful feedback to others. They might also agree on the way(s) the feedback should be provided, including linguistic considerations, e.g. (in)formal or (in)direct language, as well as group-internal deadlines for feedback comments.

Beyond that, there are multiple options to modify the course design and vary the digital feedback methods, as will be suggested below.

5.7.4. Flexibility of Course Design in Accordance with Learners' Diverse Needs

Over the years, the heterogeneity of the TRC participants has grown, especially since students with different levels of academic experience participated in it (see section 4.2). As some of them are at more advanced stages of their research journey already, they might perceive earlier phases, such as brainstorming about the topic, as superfluous. For this reason, the course design contained different options from the outset, i.e. that students could raise a pressing question that deserves detailed discussion from different perspectives by using the cloud-editor or digital board in the first feedback activity. However, due to their more advanced status, the comments by the novices were sometimes not considered as helpful or not offered at all (e.g. S001 in section 4.3.3.2). In line with pedagogical partnership approaches (see section 5.8.3), students have therefore been invited to co-design the course schedule in the first two sessions from winter term 2024/25 onwards. Notably, they were requested to describe their needs, not only regarding the current stage they find themselves in, but also with respect to the type of desired support, for instance whether they prefer an individual consultation as an alternative or

supplement to the collaborative (peer) discussions (see the comment by S011 in section 4.11.2.2).

As a warm-up activity, a cartoon of the thesis journey was shown on the screen (e.g. interactive whiteboard in classroom or in videoconference) and students were asked to mark the point they considered most applicable to their current situation (for an additional or alternative warm-up, see the image activity suggested in section 5.7.1). Afterwards, the students introduced themselves as well as their current progress and needs. Accordingly, the course schedule was filled with further details. This resonates with co-creation principles of curriculum and assessment co-design where "students and teachers wor[k] together to construct a learning environment where the responsibility for attaining learning outcomes is shared" (Doyle & Buckley, 2022, p. 1727). For example, if a student who already attended the TRC in a previous term desired an individual consultation about a data excerpt, this teacher-student dialogue could be held during a regular meeting while the other course participants are working on a specific task. Given the many theses that academics usually supervise, this approach can reduce the amount of course-external consultations and thus turn out to be timesaving. Simultaneously, the supervisees still find themselves as a part of the learning community, because they can engage in collaborative discussions at any time, join selected sessions that interest them, present their progress and ask for peer and teacher feedback etc.

This procedure aligns with the structure of the "webmeeting burger" that I introduced in my screencasting seminar (Schluer, 2020b, p. 53; 2022a, pp. 217–218). While originally designed for online teaching during the Covid-19 pandemic, it can also be implemented in on-site settings as a "meeting burger", provided that there is a separate space for personal consultations to take place. In essence, the (web)meeting burger means that individual consultations are held while the remaining students work on a task, with the consultations being preceded and followed by plenary discussions (Schluer, 2020b, p. 53; 2022a, pp. 217–218). It offers a common frame for everyone as well as room for the discussion of individual needs, which in turn can be re-embedded into the plenary towards the end of the session or in the next meeting. To give an example, if the topic of the individual consultation turned out to be (potentially) relevant for other candidates (e.g. recommendations about data analysis, specialized literature and software programs), then a general (small group or plenary) discussion can be conducted subsequently. Hence, individual consultations can also be followed up (or preceded by) group consultations and peer feedback. Certainly, the need for individual consultations might also arise spontaneously during the course, for example to discuss contradictory peer feedback that a student received. The "importance of consultations" (Frattarola et al., 2024, p. 10) has been highlighted in prior research and by the participants in the current study (see evaluation survey results in section 4.11.2.2) and will therefore be given more space in the TRC, not only in separate office hours.

As part of the course, students could also be invited to complete the "Feedback Engagement Scale" by Gan et al. (2025, pp. 293–294) as a "self-diagnostic tool to monitor, evaluate and regulate their own feedback engagement experience" (p. 290) along cognitive, emotional, social and behavioral dimensions (see section 2.4.9). This way, the participants might be better able to define their needs, reconsider their attitudes, regulate their emotions and engage in proactive behavior. Simultaneously, the course contents can be modified further, e.g. with regard to additional training in the creation of action plans.

Another possibility for further modification would be giving students a voice in the selection of the digital feedback methods or modes – and not just a free choice of the digital tools for the assignments they engage in (cf. Deehan et al., 2023, p. 1; Y. Liu, 2024, pp. 71–72). In the study by Deehan et al. (2023), students were allowed to choose between audio, written and video feedback and to evaluate the feedback by considering its mode (see own procedure in section 3.4.3). Overall, the participants "perceived the value of their self-selected feedback" more positively as compared to their previous feedback experiences (Deehan et al., 2023, p. 10; cf. p. 13). To make informed choices, it would be important to raise students' awareness of the variety of options that exists, e.g. by consulting the "Digital Feedback Map" (Schluer, 2023a). Some more specific suggestions will be expounded in the next section based on the experience that has been gained so far. The overview is certainly open to further modification, in line with technological advancements, research findings and student needs, especially through assessment co-design approaches.

5.7.5. Variation of Digital Feedback Methods and Tools

Considering the current as well as additional stages of the research journey, educators might modify the suggested course design and explore the use of further digital feedback methods and tools within an IBL approach. Some ideas for future implementations will therefore be sketched in the next sections.

5.7.5.1. Topic Exploration and Determination of Research Goals

Digital boards, as utilized in the current study, appeared to be highly fitting for the initial phase of brainstorming and topic exploration. For this, most participants chose Padlet as a tool. In future teaching, though, it might be worthwhile to consider a platform with higher data protection standards, such as TaskCards. Ideally, these mind-mapping tools would be incorporated directly into the protected learning platform of the educational institution. If they are not available, educators might instead use online discussion forums (ODFs) where students can share and discuss potential research topics (cf. Schluer, 2022a, pp. 104–109). As observed in the present study, ODFs would be less suitable, though, since they do not allow for a flexible rearrangement of individual posts and ideas. Moreover, they might appear less attractive to

students due to their simple visual layout and limited features, which may thus result in fewer interactions among the students.

5.7.5.2. Literature Review

Owing to their versatility, digital boards (or other mind-mapping tools) would likewise be convenient for the second step, the literature review. Since they allow for flexible arrangements and re-arrangements of the contents, they can be utilized to craft a "literature map", as proposed by Creswell (2014; see also Creswell & Creswell, 2023, ch. 2; cf. section 3.4.2). Furthermore, relevant resources could be linked or uploaded directly onto the digital board (see section 2.6.3). Consequently, it would be beneficial to explore the use of a digital literature map along with peer feedback processes as steps preceding the creation of an annotated bibliography.

For the annotated bibliographies, the participants in the present study employed a text-editor application with subsequent upload onto the course cloud folder (see section 3.4.2). Alternatively, a cloud-editor can be selected, allowing for a direct tracking of changes and comments. In this step, peers could likewise be encouraged to participate, instead of limiting this phase to teacher feedback only. They might share their opinions on the significance of the selected literature and offer suggestions for additional sources. Moreover, students working on related topics could create a shared team file in a literature management program (e.g. Citavi). This way, they simultaneously become familiar with software that eases the management and formatting of their literature sources, which can prove highly valuable for large projects such as a Master or PhD thesis. In case some students are already confident users of literature management programs, they could scaffold their peers' learning in addition to the support obtained from the instructor or from web manuals.

5.7.5.3. Research Design and Methodology

Similarly, for data collection and analysis, students' digital and subject-related skills can be fostered in an integrated manner by using specialized applications. For example, students might share their survey drafts directly through an online tool (e.g. LimeSurvey, SosciSurvey) in the pre-test mode. These tools typically allow for commenting on individual items or survey pages. Thus, some peers could concentrate on the clarity and appropriateness of the questions as well as on the scope and structure of the survey while considering the target population and the research objectives. If applicable, they could try to adopt the perspective of the intended audience and provide responses to test its feasibility. At the same time, the technical functionality of the survey is tested, alongside a critical-reflective consideration of the contents.

To present their research design, a short-video format might be a suitable alternative to the written draft that was employed in the present study. More advanced students might already use it at an earlier phase, i.e. during the digital speed dating, in order to present their research ideas or aims. For this, an Elevator Pitch or PechaKucha presentation could be utilized (see

Beltrán-Palanques, 2023, p. 123). The maximum length of an Elevator Pitch presentation typically is two minutes and is commonly used to advertise innovative ideas or products (Davy & Daly, 2016, cited by Beltrán-Palanques, 2023, p. 123). PechaKucha presentations, in turn, are longer, as they consist of 20 slides that last (and automatically change after) 20 seconds each, resulting in a total duration of 6 minutes and 40 seconds (Courtney-Klentzin et al., 2010, quoted by Beltrán-Palanques, 2023, p. 123). In live presentations (online, on-site, or hybrid), students can directly interact with each other, for example via audience response systems (ARS), voice or video (Beltrán-Palanques, 2023, pp. 113–114).

5.7.5.4. Data Analysis and Interpretation

Students at more advanced stages in the research process could also seek feedback on their data coding and analysis. Others might utilize their pre-test data to practice the analytical procedures. In that regard, they can present their data and progress in a seminar session, which would be followed by peer support and teacher feedback. Some analytical tools (e.g. Google Forms, MAXQDA) even offer collaborative features, which permit participants to exchange specific feedback on their analyses after the data collection. In that respect, the formation of small peer support groups can turn out to be effective.

5.7.5.5. Draft Writing

If students have already drafted chapters or sections of their theses, they could request feedback on these drafts by using a collaborative document (e.g. on the university cloud or Google Docs). Here again, it would be crucial to specify the type of feedback desired, such as comments on the flow or completeness of arguments, suggestions for additional literature sources, or corrections of linguistic aspects (see section 5.7.2.4 on feedback requests). The feedback could be tracked in real time in a cloud-editor or given and consulted with a time delay. Thus, the feedback on writing would not be limited to the teachers' expertise, but preceded by a phase of peer review that could already help to eradicate common mistakes. Additionally, AI can be profitably used at this stage, as will be discussed in section 5.7.6.

5.7.5.6. Visualization and Presentation

Apart from sharing their recorded presentation, the TRC participants uploaded their slides onto the course cloud in the present study. In the future, the slides could likewise be used as a foundation for commenting, especially when they are shared online as an editable version (e.g. Google Slides or Microsoft PowerPoint). Indeed, this was the procedure that was adopted for the student who created a Google Slides presentation for step 1, i.e. for the presentation of research ideas, in a preceding year. Direct commenting on the slides allows for specific (and lower-order) feedback, whereas entries in an online forum (or on a separate slide) would be suitable for holistic or higher-order feedback on the clarity and argumentation.

Moreover, for the video annotations, specific tools could be selected. For example, instead of using an online forum in the research presentation phase, a video platform such as TechSmith Video Review, YouTube, Filestage or Loom might be chosen. These platforms offer commenting features that permit a direct linkage between specific video parts and peers' annotations. This enables detailed feedback on precise sections of the presentation and might promote more interactive and dynamic feedback. Thus, students can address specific points and reply to them on the same platform.

While the recorded presentations in the current study were slideshows with voiceover narration, students might also be asked to utilize the webcam to convey and assess their "embodied actions (e.g., gestures, eye contact, posture)" (Beltrán-Palanques, 2023, p. 113). Naturally, this assessment criterion becomes apparent during the live presentations (online or on-site) that some doctoral students or external scholars had held in previous TRC implementations. Another assessment dimension could be "the presenter's ability to interact and respond to questions and comments" (Beltrán-Palanques, 2023, p. 113). In the present study, the recorded presentations freed off class time for interactive discussions during the synchronous sessions. However, it was observed that the amount of student interaction varied during the meetings, with some involving extensive exchanges, whereas other presentations were hardly discussed by the peers. This could have had various reasons: Some participants might not have watched the presentation beforehand, e.g. as there were too many (see section 5.7.3 for limiting the number of peers or determining a minimum number of reviewers). Others had already shared their opinions in detail in the online forum. Sometimes the presenters had already replied to the open questions from their peers, thus making further discussions superfluous, whereas others did not yet have the time to read the peers' comments in advance. Furthermore, several students forgot to insert specific questions for their audience as part of their presentation (feedback requests) so that it was harder for the peers to offer relevant feedback. To make the discussion more interactive, the presenters could be asked to prepare supplementary questions for the live meeting. Audience Response Systems for polling in the live sessions (or in the videoconference application) might additionally be used to obtain quick feedback on open questions and to check fellow students' understanding of the presentation contents.

In smaller classes, live presentations could be a viable alternative, either in the on-site classroom or in a webmeeting. In the latter case, videoconferencing tools with built-in feedback features can be utilized, including live polls, text pads, chats and audio/video interactions (see Schluer, 2022a, pp. 209–221). In different modalities, then, the peers and the instructor can provide real-time feedback on the presentation style, content and language, as well as offer responses to open questions.

5.7.5.7. Research Proposal

To enhance students' multimodal literacy skills even further, video abstracts could be submitted alongside the written research proposal (cf. Beltrán-Palanques, 2023, p. 112), as these are nowadays welcome supplements to published articles in an increasing number of online journals. In the TRC, they would represent a revised and more concise version of the recorded presentation from the previous step. Similar to or as an alternative to the research design video that was suggested above, the Elevator Pitch format could be utilized, with an overall length of about 2 to 3 minutes. This short video might also be eligible for another round of peer review. Hence, the step of finalizing the research proposal may again be complemented by peer feedback instead of instructor feedback only. Furthermore, the students could be encouraged to share their written draft of the research proposal within their peer groups before submitting the finalized version to the supervisor. For this, word processors or cloud editors with track changes and revision history features constitute a very common and convenient solution. They allow for a transparent (re-)view of edits and feedback and thus facilitate the revision process. Moreover, some cloud editors (such as Google Docs) have a supplementary chat window, which can lead to more interactive and detailed exchanges (see Schluer, 2022a, p. 98).

For feedback on language, automated writing evaluation tools (e.g. Grammarly) and AI applications may offer further corrections and suggestions (see e.g. Schluer, 2022a, pp. 78–91; 2024j; Tam, 2025, p. 226; cf. section 5.7.6 below). However, combining these with peer and/ or instructor feedback is recommended (see Vogt & Flindt, 2023, p. 187; Woodworth, 2023, p. 200) to assess the suitability of automated suggestions (cf. Schluer & Maschke, 2025). Finally, instructors could provide additional feedback on writing style, clarity and adherence to academic conventions as well as on the feasibility and suitability of the proposed research.

To highlight students' learning gain in the research planning process and/ or showcase improvements across successive submissions of the proposal draft, screencast-based ipsative assessment (SIA), as suggested by Ebrahimi and Ebadi (2024), could be a fruitful future avenue. Ipsative assessment means tracking and evaluating students' progress by comparing their current submission to previous ones (Hughes, 2011, cited in Ebrahimi & Ebadi, 2024, p. 2). This may help to foster "a sense of self-growth rather than […] competition with their peers" (Ebrahimi & Ebadi, 2024, p. 3, based on Hughes, 2011, 2017). In SIA, then, both earlier and current drafts are shown side by side on the screen, while the feedback provider compares the two versions, provides developmental feedback by commenting on the improvements and offering further suggestions (Ebrahimi & Ebadi, 2024, pp. 2–3, 13–14). Through a pre- and post-test, the researchers discovered significant improvements in "performance, self-regulation, and self-efficacy" (Ebrahimi & Ebadi, 2024, p. 17). Furthermore, the scholars argued that SIA can encourage reflection and further dialogue (Ebrahimi & Ebadi, 2024, p. 2) and might be conducive to self-regulated learning (e.g. Malecka et al., 2021, quoted by Ebrahimi & Ebadi, 2024, p. 6), as it makes students more aware of their learning strategies and the learning goals (Zhou & Zhang,

2017, cited in Ebrahimi & Ebadi, 2024, p. 6). Similarly, learning diaries and e-portfolios can support these reflective practices, as will be outlined next.

5.7.5.8. Reflection and Self-Assessment

Throughout the research (planning) and academic writing process, it would be useful for the students to create personal reflection journals or research diaries (cf. Reinmann, 2013, p. 47). They allow them to document their thoughts and struggles in their research journey as well as the solutions they have found rewarding (or not). Such regular journalling can prove useful, given the complex, non-linear and demanding nature of the research and academic writing process. These "research journals" can be created in any modality or language that students feel most comfortable with, as Kunkel and Gilliland (2023, p. 23) suggested. While students could likewise use paper-based diaries for this, digital portfolios offer several benefits: Students could seamlessly integrate their assignments and feedback they have obtained and complement them by their personal reflections and action plans (see Schluer, 2022a, pp. 222–230, on digital feedback portfolios; cf. Malecka et al., 2021, cited by Ebrahimi & Ebadi, 2024, pp. 7, 20–21). They can keep these portfolios private (Woodrow, 2020, pp. 5, 89) or share them with (selected) peers and/or the instructor to enhance the depth of their reflections. The idea of a "collaborative dialogue journal" as "a safe space […] [to] support, extend, or refute one another's ideas" (Adams & Flessner, 2024, p. 129) might be worth exploring, especially if peers concentrate on similar topics or methodologies. For qualitative studies in particular, such research diaries could turn out to be highly valuable since the students continuously reflect on their research progress, helping them derive recommendations for possible modifications in the future outlook part of their final thesis.

5.7.5.9. Further Considerations

Overall, it becomes clear that there are manifold opportunities to integrate digital tools productively into the research (planning) and writing process. Certainly, to some extent, the colloquium could also be conducted in a face-to-face or hybrid format, as was done in some TRC implementations. Regular feedback from the students on the course procedures as well as teachers' reflections will most likely lead to further amendments in the future (cf. Beltrán-Palanques, 2023, p. 116). This not only pertains to the contents, feedback training and tasks as part of the pedagogical design, but also to technological details (cf. e.g. the TPACK model by Koehler et al., 2013; Mishra & Koehler, 2006).

In the current research, a university-internal cloud storage as well as external digital tools were utilized in addition to the learning management system OPAL. Due to the limitations of OPAL, it was not possible to manage the feedback processes via one application only. If available, however, the review features of more comprehensive learning platforms could be used at each stage to organize and anonymize the feedback processes as desired (Schluer, to appear).

Moreover, the online system might be configured as a scaffold for peer feedback, reflection, and action planning, as illustrated by Wu and Schunn (2021, pp. 371–372), who utilized Peerceptiv (see also Tseng & Er, 2024). Students can enter, access and react to each other's comments, make revision decisions and give reasons as well as set priorities and determine concrete steps for action (see Tseng & Er, 2024; Wu & Schunn, 2021, p. 372). The elicitation of reasons for comments and replies can progressively foster students' feedback literacy and lead to deeper engagement and learning.

Generally, online peer review systems could be employed at any stage for anonymous or attributed peer feedback. As long as the number of students is comparatively small, it might not be necessary to use such a system. With larger numbers, however, it can be particularly beneficial for streamlining the organization on the teacher's side as well as students' data management and (anonymous) commenting options. There is thus a need for an LMS that effectively integrates various feedback mechanisms and can be adjusted flexibly to meet student- and task-specific demands.

Another observation during the present research were similarities and differences in the feedback tools used, which were related not only to the feedback modes (primarily written and/or oral) and timing (asynchronous and/ or synchronous), but also to the specific features of the chosen tool (e.g. settings of a digital bulletin board like Padlet or Jamboard, or different cloud editors such as NextCloud or GoogleDocs). Each digital tool appears to have unique functions and thus varying affordances and limitations for feedback purposes. It was also noted that participants in this study exclusively employed text comments on digital boards and online forums, despite the technical possibility to include voice or video comments or upload other attachments. Therefore, more time might need to be invested to develop students' "multimodal literacy" (see e.g. chapter by Beltrán-Palanques, 2023), which is the ability to use multiple semiotic resources to construct meaning (cf. Kress & Van Leeuwen, 2001, quoted in Beltrán-Palanques, 2023, p. 103). Ideally, a comprehensive learning and feedback system would also allow for multimodal feedback provision and action planning by transcending the written mode that has mostly been used in prior work.

In sum, the integration of digital feedback methods at different stages of the inquiry-based research process could enhance the quality of students' research projects and final theses while fostering collaborative, reflective and iterative learning at the same time. In that respect, digital technologies can help to exchange timely and constructive feedback and encourage continuous improvement throughout the research journey. Additionally, AI can play an assistive role at distinct stages of the research journey, as will be suggested below.

5.7.6. Use of Artificial Intelligence in the Research Planning and Writing Process

In addition to self and peer feedback (as well as teacher feedback), AI can be used in various phases of the research planning and academic writing process. As Iftanti et al. (2023) illustrate,

AI could, for instance, help "to find [a] framework of [the] research topic, to develop and brainstorm ideas; […] to find review literature; and […] to check the grammar error[s] in their research proposal" (p. 455; see also Borger et al., 2023, for an overview). These and other aspects will be discussed further in the next paragraphs.

5.7.6.1. Topic Exploration and Literature Searches

In the initial phase of topic exploration, general AI tools like OpenAI's ChatGPT, Microsoft Copilot, Google Gemini or Perplexity.ai, but also more specialized ones like Researchrabbit.ai and Ask ORKG (Open Research Knowledge Graph) can support students in generating research ideas by analyzing vast amounts of (academic) literature and identifying emerging trends and gaps. This way, a student might discover new areas of study that have not become immediately apparent through traditional search methods. Also, chatbots can produce lists of suitable keywords that could be used for manual searches in different databases (Huang & Tan, 2023, p. 1149). Moreover, chatbots might help derive possible subtopics (Huang & Tan, 2023, p. 1150) and research questions that one could investigate further.

Similarly, AI tools can assist researchers in gaining a first overview of the field, which could be a starting point for deeper explorations. For instance, on Ask ORKG (https://ask.orkg.org/), students can pose a question about the research topic they are interested in. Based on a large dataset of published research, the tool then offers a brief summary (drawing on the top 5 papers) and lists numerous further publications below. For each paper, not only reference information is provided (often with a download link) but also structured syntheses of the main results and their contributions to the question that was posed by the user. While this may serve as a useful first orientation, it becomes apparent upon closer inspection that the types of content listed in the different columns for each paper are not consistent, but often repetitive or even unavailable. However, there are also some filter options that might help to fine-tune and compare the results, such as according to the year of publication (e.g. about the role of culture and national identity in the 1950s, 1990s and 2020s).

Similarly, with Researchrabbit.ai, students can search for literature (cf. Borger et al., 2023, p. 925) and add relevant publications to their collections. In that respect, the sources could be exported to a literature management system, such as Zotero or Citavi. The algorithm provides personalised recommendations based on a specific research topic and previously added papers. For that purpose, users can upload publications and ask the AI to propose similar and recently published papers in related fields. However, the "related articles" option of Google Scholar could likewise be exploited for this purpose. Moreover, the temporal, linguistic and sociocultural biases of many AI tools require critical consideration (Ray, 2023, p. 147). Topic explorations should therefore be complemented by manual searches of recent journal articles, (online) libraries and other scholarly databases. Accordingly, AI tools can assist in the literature search process by sifting through the underlying database as well as by synthesizing the

information. However, the quality of the suggested publications might vary, thus making it necessary for the users to critically evaluate their suitability and relevance.

Once relevant literature has been identified, tools like ChatPDF or Elicit.ai could be utilized to scan the texts for relevant information and summarize them (cf. Borger et al., 2023, p. 925). For instance, ChatPDF can convert complex academic papers into more manageable summaries, highlighting key findings and methodologies, thus saving time and improving comprehension. This way, tools like ChatPDF could support students in creating annotated bibliographies and gaining an overview of the research designs that were employed in previous studies. Consequently, they might be useful in identifying research gaps that the students could address. To elicit appropriate output, students need skills in asking relevant questions about the text, which encourages their active engagement and inquiry skills (see Schluer, 2024j). As several tools are capable of mentioning concrete page numbers for the information they provide, the verification process is facilitated for the students. This manual check is crucial since AI-generated summaries can be inaccurate (Borger et al., 2023, p. 926).

Finally, AI also helps to overcome language barriers, as its multilingual capacities can support users in understanding research articles in a foreign language (Borger et al., 2023, p. 925). In that regard, readers might ask the AI to translate an article or to summarize it in a more familiar language (Borger et al., 2023, p. 925).

5.7.6.2. Planning of Teaching Interventions and Research Methodologies

Likewise, for the planning of teaching interventions and research designs, AI can prove valuable. As for teaching, general AI (such as ChatGPT) or specialized AI (e.g. https://to-teach.ai/, https://app.diffit.me/, https://autoclassmate.io/ or https://www.lessonplans.ai/) could be utilized to design lesson plans and to create instructional materials. Similarly, generative AI can remind users of the steps involved in the research process, offer templates for research plans as well as suggestions for suitable methodologies and feedback on their drafts of data collection instruments. To receive relevant output from the AI, the students need to provide sufficient contextual information and directions. Hence, solid background knowledge and skills in adequate prompting are needed. Accordingly, it would be essential to include "the art of prompting" into the curriculum (Cross, 2024, p. 7). In the end, the quality of output and feedback given by generative AI will be "influenced by the quality of input by the user" (Cross, 2024, p. 9).

With regard to research instruments, users might ask AI bots to improve survey or interview questions, for instance (Borger et al., 2023, p. 925). Furthermore, AI tools can assist in analyzing the collected data as well as in creating visual representations (Borger et al., 2023, pp. 925, 929). To varying extents, AI has already been incorporated into established tools for data analysis (e.g. MAXQDA) and writing (e.g. Microsoft Word), leading to a growing interplay between human and technical expertise in the research and academic writing processes (Luo, 2024, p. 661). Its possible role in supporting writing processes will be sketched next.

5.7.6.3. Academic Writing

AI tools can facilitate the academic writing process in numerous ways. During typing, many text editors, such as Microsoft Word or Google Docs, nowadays offer built-in features for text corrections and text predictions (see Schluer, 2024a, pp. 317–318). Thus, on the one hand, errors can already be avoided during draft writing (text corrections), and on the other hand, the writing process can be accelerated by accepting the suggested word parts (text predictions). Additional affordances arise from speech-to-text technologies. They empower authors who would otherwise have difficulties in producing typed text (for a variety of reasons, e.g. injured arm, dyslexics, low target language proficiency) to transform their spoken language into written texts. Furthermore, the multilingual capabilities of AI "can help to bridge the communication gap" (Borger et al., 2023, p. 927) for foreign language users by translating texts (or spoken input) into the target language (see section 5.7.6.1).

During the review phase, specialized AI for academic writing, as for instance Paperpal, but also general AI, such as ChatGPT, or AWE (automatic writing evaluation) tools (e.g. Grammarly) can be used to assess drafts for grammatical correctness as well as stylistic appropriateness and offer recommendations for improving the clarity and coherence of a text (cf. Tam, 2025, p. 226). Users can insert or upload their draft and write a specific feedback request as a prompt (see Schluer, 2024j, pp. 282–284). The AI will then propose possible improvements to enhance the clarity and argumentation and pinpoint grammatical errors (Huang & Tan, 2023, p. 1150). Additionally, generative AI can help (student) researchers in "organiz[ing] the subtopics into a logical outline" as well as in adding details for each (Huang & Tan, 2023, p. 1150). It could also suggest a model text that students can utilize as an orientation in terms of structure and style (Huang & Tan, 2023, p. 1150). Users, however, still need to check the appropriateness of the corrections and suggestions, as AI lacks a conceptual understanding of the field (Huang & Tan, 2023, p. 1151; cf. Borger et al., 2023, p. 933) and of the particular requirements and relational aspects in specific supervisory contexts. As Borger et al. (2023) explain, "[t]he output from a generative model is statistically reconstructed language and does not guarantee scientific coherence" (p. 926). Hence, the summaries might only seem nicely worded on the textual surface (cohesion), but incorrect, inappropriate or illogical at the deeper conceptual level (coherence). Also, there is a risk of (unwitting) plagiarism if, for instance, students utilize and paraphrase the AI output in a way that makes it similar to the original text the AI has drawn on but not cited (Huang & Tan, 2023, pp. 1151–1152). This danger is less pronounced when users merely ask the AI to check and correct a text that they have produced themselves in terms of lower-level aspects of mechanics, grammar and word choice (cf. Borger et al., 2023, p. 927). Put differently, AI might serve as a useful "proofreading tool" (Borger et al., 2023, p. 927), with enhanced capabilities as compared to traditional AWE software because users can enter into extended dialogues with the chatbots while finetuning their prompts for the review process.

In fact, AWE systems have been in use for a long time already (see review by Schluer, 2022a, pp. 78–91). They encompass automatic written corrective feedback (AWCF) and automated essay scoring (AES) and are based on a repository of resources, e.g. dictionaries (as reviewed by Woodworth, 2023, p. 201). These tools provide instant feedback to learners and can promote their writing, but they lack interpersonal and contextual information and might undermine the social aspects of writing (Woodworth, 2023, pp. 200–204). Moreover, while they can help in error detection and offer metalinguistic feedback (Bitchener & Storch, 2016, quoted by Woodworth, 2023, p. 220), their limitations result from the generic nature of the comments (Woodworth, 2023, p. 201) and their inability to assess the full writing construct, including argument quality and content organization (Ericsson & Haswell, 2006, cited in Woodworth, 2023, p. 203). Students therefore find "hybrid feedback" — combining teacher and AWE feedback — more helpful, which is more specific to their needs (Woodworth, 2023, p. 200). Thus, AWE and generative AI should complement, not replace, teacher feedback (Woodworth, 2023, p. 200; cf. Huang & Tan, 2023, p. 1151). Another source of feedback triangulation stems from peers. Hence, AWE or generative AI could be used in conjunction with peer feedback as well as teacher feedback (Vogt & Flindt, 2023, p. 187). Peers could independently or collaboratively explore an AWE tool (such as Grammarly) and then discuss the (mis)coded errors, trying to search for reasons to accept or reject the suggestions (Vogt & Flindt, 2023, p. 187; see Schluer & Maschke, 2025, for a practical task).

Moreover, chatbots might simulate as well as stimulate peer review processes by generating questions and comments which encourage deeper reflection on the content (see Schluer, 2024j). To enhance peer feedback processes, AI could play a supporting role by providing structured templates and guiding questions as well as by generating feedback requests for the areas students feel insecure about (see section 5.7.2.4). Similarly, for feedback responses and the continuation of feedback dialogues, chatbots can fulfil important functions due to their conversational nature (Schluer, 2024j, p. 288).

Such AI functionalities could be integrated into learning and feedback systems to assist peer review and self-assessment. For example, the AI could evaluate the peer comments while students are entering them and elicit further details or explanations (cf. Wu & Schunn, 2021, p. 387). Generative AI may also serve "as a personal tutor" for self-reflection and self-assessment if prompted adequately (Tam, 2025, p. 223). In that regard, students might need guidance by their teachers (Tam, 2025, p. 233), who should also make them aware of the critical and ethical use of AI for research purposes and academic writing.

5.7.6.4. Summary and Outlook

Generally, it appears that AI tools can help to streamline various phases of the research and teaching process, which might not only be timesaving but could also enhance the quality of the process and its products. However, it is crucial not to solely rely on AI outputs but to develop

critical-reflective and evaluative skills for a productive, conscious, and ethically appropriate use (cf. Schluer, 2024j; Schluer & Maschke, 2025). By systematically integrating relevant AI tools into research colloquium sessions (and other seminars), the required competencies can be fostered incrementally. Through guided exploration and (collaborative) SWOT analyses, students learn to critically evaluate AI tools, understanding their strengths, weaknesses, opportunities, and threats. For example, a SWOT analysis might reveal that – while an AI tool is excellent at identifying grammatical errors (strength) – it may not fully understand the context-specific nuances of a research topic (weakness). Altogether, a balanced interplay of AI and human intellect is needed, which could be developed through guided and collaborative explorations of AI. This does not only pertain to the research and academic writing process, but also to other contexts of use. As piloted in my "Digital Teaching" course in summer term 2024 at Chemnitz University of Technology, this collaborative exploration and discussion can contribute to building AI literacy. It may also help to avoid the dangers arising from an excessive use and overreliance on AI that hinders "personal creativity and unique writing styles" (Gültekin Talayhan & Babayiğit, 2023, p. 90).

In the context of doctoral supervision, the impact of AI for feedback purposes, also in concertation with human feedback sources, has been hardly researched so far. A recent study, though, explored the value of generative AI from the perspective of a PhD candidate who consulted ChatGPT (a) for feedback on a paper draft before submitting it to his supervisors and (b) for receiving guidance on the supervisors' draft annotations in preparation of a video-consultation with them (Jensen et al., 2025, p. 4). The authors argued that the conversational nature of chatbots might foster dialogic feedback exchanges (Jensen et al., 2025, p. 1), but that the nature of these conversations and the feedback given differs along several parameters. On the one hand, supervisors were not only able to draw on their own experiences when giving advice to the student, but were also able to contextualize them in the present stage of the thesis journey (p. 7). Accordingly, on the relational dimension, they showed a deeper understanding of the students' learning process (p. 9). On the other hand, the supervisors expressed their own standpoints, while the chatbot presented several different options to the thesis writer (Jensen et al., 2025, p. 7), thus encouraging greater student agency over their decisions (p. 10). Supervisors, in turn, might be better able to assess the suitability of the different suggestions, e.g. concerning their feasibility in relation to the entire PhD process (p. 10). Here, they usually "share their doubts and uncertainties", whereas the advice by the AI seems to be more on "getting the task done" through immediate, task-focused feedback (Jensen et al., 2025, p. 10).

Overall, though, the use of AI chatbots might foster feedback-seeking and proactive engagement, which is in line with current conceptualizations of feedback literacy (cf. Jensen et al., 2025, p. 2; Schluer, 2024j; see section 2.2). The AI output may additionally prompt reflections (cf. Bridgeman & Giraldez-Hayes, 2024, p. 38) and decision-making (Jensen et al., 2025, p. 6), especially when students assess the value of different feedback sources. Ultimately, an

integration of AI with teacher and peer feedback could enhance critical language awareness and improve learning outcomes (Schluer & Maschke, 2025; Vogt & Flindt, 2023, p. 187; cf. Schluer, 2024j, pp. 301–302). Students thus need strategies for critical reflection and verification of AI outputs to identify errors and make informed judgments (cf. Kasneci et al., 2023, p. 7). In that respect, the use of multiple feedback sources can foster critical thinking (cf. Kasneci et al., 2023, p. 5) and improve the quality of learning products and processes. Through this, they could become confident users of AI and, as future teachers, they might be empowered to develop AI literacy among their students as well (cf. Chilla et al., 2021, cited in Vogt & Flindt, 2023, p. 194; Hohaus & Heeren, 2023, p. 9).

Consequently, collaboration, communication, critical thinking, and creativity appear to be particularly relevant for the use of AI and other digital technologies. Indeed, they form the "4Cs of Education" in the 21st century (Trilling & Fadel, 2009), as will be elaborated next.

5.7.7. Broader Considerations for Educational Practices: The Cs of Education

According to the *OECD Learning Framework 2030*, students need a broad range of skills to cope with unfamiliar and ever-changing situations and to apply their understanding adequately in a variety of contexts. The authors of the framework emphasize the importance of learner agency, i.e. their "responsibility to participate in the world" and change it for the better (OECD, 2018, p. 4). At the same time, they draw attention to the concept of "co-agency", i.e. "the interactive, mutually supportive relationships that help learners to progress towards their valued goals" (OECD, 2018, p. 4). Fostering the skills pertaining to the "Cs of Education" appears highly conducive to reaching those goals. Scholars in the field of education often refer to these skills as the "4 Cs", which include critical thinking, communication, collaboration, and creativity (Trilling & Fadel, 2009; see e.g. the studies by Bedir, 2019; Erdoğan, 2019; Jalinus et al., 2023; Nganga, 2019; Selman & Jaedun, 2020; Winaryati et al., 2020). The Partnership for 21st Century Skills network recognizes these skills as crucial for students to succeed in the dynamic and challenging landscape of the 21st century (Trilling & Fadel, 2009).

The first C, "critical thinking and problem solving", involves students' ability to actively filter, analyze, synthesize and question information from diverse sources to construct meaningful understandings and solutions (Partnership for 21st Century Skills, 2009; cf. Anugerahwati, 2019, p. 166). The second C, "creativity and innovation", underscores a person's capacity to generate novel ideas individually and collaboratively, be open towards new perspectives and implement as well as assess innovations for continuous improvement (Partnership for 21st Century Skills, 2009). The third C, "communication", entails the ability to effectively convey ideas and information in a concise, clear and coherent manner (Anugerahwati, 2019, p. 166) as well as in different media and modes (and languages). It also comprises skills in attentive listening and meaning negotiation in interpersonal interaction (Partnership for 21st Century Skills, 2009). The fourth C, "collaboration", requires proactive engagement with others and denotes

the ability to utilize their distinct personalities, talents and expertise effectively and responsibly to synergistically produce better outcomes that benefit the community (Anugerahwati, 2019, p. 166; Partnership for 21st Century Skills, 2009). Collaboration can thus cultivate creativity and rests on effective communication skills (Tom, 2015, p. 24), which underscores the manifold connections between the different Cs.

To foster these skills among learners, "[t]eachers must become 21st century learners themselves, learning from inquiry, design, and collaborative approaches that build a strong community of professional educators" (Trilling & Fadel, 2009, p. 119). Continuous professional development thus becomes crucial, comprising, e.g., reflective practice and the resultant ongoing improvements of teaching and the curriculum. This is also captured in the "21st Century Learning Framework" by Trilling and Fadel (2009, pp. 119, 173). While these skills are promoted through the inquiry-based peer learning approach in the TRC, it would be essential to foster them throughout the entire degree program as well, i.e. in preceding courses and modules, in order to make the skills development more sustainable. The next section will therefore advance some suggestions for program development in higher education curricula.

5.8. Suggestions for Professional Development and Participatory Practices

For successful educational design, the involvement and investigation of various stakeholder groups is essential. It comprises, for instance, the individual (cognitive, affective, strategic, etc.) level, the interpersonal level (e.g. teachers and students as well as peer approaches), the group or classroom level, a material or resource level, as well as an institutional level (Collins et al., 2004, p. 35). Collaborative and participatory approaches that actively engage stakeholders from all levels are therefore gaining in importance. Simultaneously, these partnership approaches presuppose changes in pedagogies and research practices to which the current section will be devoted.

5.8.1. Approaches to Continuous Professional Development

Continuous professional development (CPD) encompasses a diverse spectrum of individual and collective activities dedicated to augmenting teachers' professional and personal knowledge, skills and attitudes (cf. the review by Lessing & de Witt, 2007, p. 55) through both informal and formal learning (Abakah, 2023, p. 3; Guskey, 1995, p. 265, cited by Jesus-Díaz, 2024, p. 16; Main, 2021). This includes self-directed initiatives (Bailey et al., 1998, quoted in Kasprabowo et al., 2018, p. 125; cf. the review by Tyagi & Misra, 2021, p. 118) as well as external training and support (e.g. Kennedy, 2005, cited in J. Rose & Reynolds, 2006, p. 219). It involves deliberate and ongoing efforts by teachers to critically reflect on their knowledge, beliefs and practices as well as to extend their professional competence and expertise beyond their initial training for the benefit of student learning (Abakah, 2023, p. 1; Alemayehu, 2021, p. 1; Avalos, 2011, p. 10; Day, 1999, quoted by Adu & Okeke, 2014, p. 272). Such a need for CPD becomes

obvious in view of the ongoing changes in society, technology, theory and pedagogy (cf. Merliza & Retnawati, 2018, p. 81), which require them to stay abreast of developments and explore innovations in teaching methods.

At the same time, technological developments in the field of AI could support teachers and teacher educators in their reflective practices and CPD, e.g. by aiding in the analysis of their supervisory practices. Analogously to what Bridgeman and Giraldez-Hayes (2024) proposed in the context of CPD in sports coaching, AI-enhanced software might provide analytical data on supervisors' feedback practices, such as the distribution of speaking time between assessors and assessees, the amount and types of question posed (open, closed) as well as other interactional features (p. 35). These AI-supported analyses can deepen supervisors' reflections (Bridgeman & Giraldez-Hayes, 2024, p. 38), but they need to be considered with caution, as AI usually lacks sensitivity to contextual (Bridgeman & Giraldez-Hayes, 2024, pp. 32, 38–39) and interpersonal nuances of the feedback practices (see section 5.7.6.4 above).

Moreover, CPD presupposes a shift in mindset as far as dialogic and participatory feedback processes are concerned. Similar to the differing views of student and supervisor roles outlined in section 2.4.2, there are different models of CPD that place teachers (as learners) into rather passive or more active roles (see the review by Williams, 2020). They are either based on hierarchical expert-novice paradigms or on collaborative peer or partnership approaches (see Williams, 2020, pp. 63–66). Even though research evidence is scarce, it appears that the latter is to be favored and has been increasingly advocated in recent years.

For instance, according to the training model (Little, 1994, cited by Williams, 2020, p. 63), an expert delivers training to teachers, e.g. in the form of a presentation. While a relatively large number of teachers can be reached this way, this type of CPD event lacks a specific connection to individual teachers' classrooms (Day, 1999, cited by Williams, 2020, p. 64). Nonetheless, through strong peer networks and collegial support structures (see section 5.8.2), the attendance of specialized training or coaching can prove to be effective. More precisely, the participating teachers would apply and communicate their learning gain to colleagues, thus creating domino effects, which are in line with the cascade model of CPD (Kennedy, 2005, quoted by Williams, 2020, p. 64). Yet, training events are often driven by a deficit model of teachers' skills or performance (Williams, 2020, p. 64), not by the desire of promoting positive change. Likewise, coaching or mentoring models might imply or reproduce power imbalances, with a "master" (Avalos, 2011, p. 18) or expert giving advice to teachers (Williams, 2020, p. 65). In that respect, some scholars differentiate between mentoring and coaching: "Mentoring" is associated with "knowledge transfer" (O'Leary & Savage, 2020, p. 147, cited by Kanuka & Sadowski, 2024, p. 8) and "guidance" (Louson et al., 2024, p. 224, with reference to Landreville et al., 2019) in an "expert/ novice relationship" (Griffiths, 2005, quoted in Louson et al., 2024, p. 224). By contrast, "coaching" occurs in "a more equal partnership" (ibid.) that "stimulates performance improvement" (Louson et al., 2024, p. 224, referring to Landreville et al., 2019) through

reciprocity (Eisen, 2000, p. 5, cited by Pendley & Narciso-Owen, 2024, p. 200), collegiality (Huston & Weaver, 2008, p. 5, quoted in Naftzinger & Vaughn, 2024, p. 93) and co-creation (Fabrey et al., 2024, pp. 77, 80). Accordingly, contemporary perspectives on coaching foreground mutual learning for coaches and coachees (or "co-coachees", see Fabrey et al., 2024, p. 77) alike, since both can improve their own practices in this process (as reviewed by J. Rose & Reynolds, 2006, p. 221). The next subsection will therefore deal in more detail with faculty peer coaching before participatory pedagogies are discussed.

5.8.2. Faculty Peer Coaching and Collaboration

While the majority of this book and the study that was conducted concentrated on peer feedback among students, the present section will foreground peer feedback among teachers or thesis supervisors, respectively.

There is an increasing consensus in the CPD literature that supports a "new pedagogy" of partnership approaches to professional development (Fullan, 2013, cited by Stevenson et al., 2016, p. 825). Regular peer discussions and reciprocal learning therein play a crucial role, including "collaborative conversations, application, and reflection in light of local circumstances" (Alemayehu, 2021, p. 5; see also Abakah, 2023, p. 7). Additionally, feedback on the effectiveness of the changes is pivotal (Guskey, 2002, pp. 387, 389; Lessing & de Witt, 2007, p. 56) to "collaboratively assess, evaluate, develop, and/or reflect on teaching" (Kanuka & Sadowski, 2024, p. 4, citing Lang, 2019). Peer feedback is thus an integral part of peer coaching to propel "learning with and from their colleagues" (Kasprabowo et al., 2018, p. 125, citing Al-Asmari, 2016; see for example the edited volume by Rainville, Title, and Desrochers, 2024, on faculty peer coaching). It is defined as a "'collegial process whereby two faculty members voluntarily work together to improve or expand their approaches to teaching' (Huston & Weaver, 2008, p. 5) through 'giving and receiving guided critiques to one another's teaching practices' (Burrows et al., 2011, p. 1)" (Naftzinger & Vaughn, 2024, p. 93).

To accomplish this, similar pre-conditions as for student peer feedback need to be fulfilled, including an atmosphere of trust and safety, openness, curiosity (Fabrey et al., 2024, pp. 78, 81, 84) as well as shared goals, i.e. the desire to reach a deeper or better understanding and thus improve performance (cf. Huston & Weaver, 2008, p. 5, cited in Manzo & Schrock, 2024, p. 303; Kanuka & Sadowski, 2024, p. 4). Teachers should thereby proactively seek opportunities for learning and feedback (cf. the review by Peltier et al., 2024, p. 85), adopt an inquiry-oriented stance (Göker & Göker, 2024, p. 61; see section 3.2), provide honest, appreciative and constructive feedback themselves (Freed et al., 2024, p. 110), and possibly develop long-lasting peer coaching relationships (Neiswender, 2024, p. 37). The success of these partnerships approaches hinges on specific attitudes, including "a willingness to share" knowledge and negotiate convictions, as well as the recognition that sharing entails disclosure and being open to feedback (Day, 1999, p. 229). For teachers, it is also crucial to acknowledge that change can be

threatening, challenging, yet ultimately fulfilling (Day, 1999, p. 229). Nevertheless, people's capacity to share emotions, thoughts and practices might be limited due to personal, professional and cultural backgrounds (Day, 1999, p. 229). In that respect, peer dialogue is key in order to reveal underlying convictions, understandings and attitudes, to specify a concrete focus for the coaching, and to agree on observation procedures as well as feedback practices (Neiswender, 2024, p. 28). To facilitate the peer coaching and feedback process, rubrics or checklists could be used, such as the ones by Ranson and Colgate (2024, p. 146) or McGuire and Burdick (2024, pp. 338–340).

Similarly, collaborative curriculum (and assessment) design among staff members can prove valuable for professional development (Voogt et al., 2015, p. 259). This approach involves teachers in creating new materials or adapting existing ones collaboratively while exploring new technologies and pedagogical concepts and offering reciprocal support (pp. 260, 267). Notably, peer feedback can foster reflective practices and turn it into an integral component of the professional habitus. This collaborative approach has recently been implemented in the TESOL course "Curriculum Planning & Materials Development" (see also Y. Liu, 2024) as well as in the new "Digital Teaching" seminar at Chemnitz University of Technology (see Schluer, 2024i; Schluer, accepted).

Ideally, peer coaching is not a single event, but occurs in a cycle or spiral with multiple observations and conversations, leading to continuous improvements (Manzo & Schrock, 2024, p. 311; see also the illustrations of a "peer coaching cycle" by Rainville, Desrochers, & Title, 2024, p. 407, as well as the more elaborate cycle by Helms et al., 2024, p. 245). It can also profit from multidisciplinary peer groups (cf. Gast et al., 2017, in Neiswender, 2024, p. 37), such as through interdisciplinary thesis supervision. Finallly, establishing a habitus of learning among teachers may eventually serve as a role model for students. Moreover, greater student empowerment can be accomplished through participatory pedagogies, as will be discussed next.

5.8.3. Participatory Pedagogies

Especially in teacher education programs, the cultivation of student-staff partnerships appears promising. These participatory pedagogies constitute "co-constructed educative practices between students and teachers" (Gillett-Swan & Baroutsis, 2024, p. 534). More precisely, pedagogical partnership is "a collaborative, reciprocal process through which all participants have the opportunity to contribute equally, although not necessarily in the same way, to curricular or pedagogical conceptualisation, decision making, implementation, investigation, or analysis" (Cook-Sather et al., 2014, pp. 6–7). Students' involvement can thus be of various kinds, including the co-design of tasks, the co-creation of curricula, co-teaching, co-assessment, and co-research (Blau & Shamir-Inbal, 2018, p. 315; Cook-Sather & Matthews, 2021, p. 247; Healey et al., 2014). Such approaches challenge traditional power dynamics (Healey et al., 2014, p. 21)

and can lead to improved teaching and learning experiences which cater for students' needs (Bell et al. 2013, p. 499, cited by Healey et al., 2014, p. 36). Indeed, increased student engagement and motivation as well as a sense of ownership of the learning process were cited as the most frequent positive outcomes according to Mercer-Mapstone et al.'s (2017) literature review (p. 25). On second rank, increased confidence and self-efficacy were noted, followed by a better understanding of the teachers' perspective (p. 25). Further advantages, among many others, included an improved student-staff relationship characterized by greater trust as well as better self-evaluation skills (Mercer-Mapstone et al., 2017, p. 25).

With particular respect to the assessment dimension, Chan and Chen (2023) conducted a literature review of 43 studies, which helped them draft a framework of student partnership in assessment. It consists of four areas of partnership, four student roles, and four types of staff support for students' contributions. More precisely, student partnership can occur in four major areas of assessment, operating at different institutional levels: (1) assessment and feedback design, (2) execution and implementation, (3) quality assurance, and (4) policy establishment (pp. 1405–1406, 1409). To aid students in the partnership process, staff can provide four types of support, i.e. (i) essential knowledge, (ii) training and coaching, (iii) accuracy and quality check, and (iv) partnership management (Chan & Chen, 2023, pp. 1408–1409).

In all these areas, students can actively participate in four different but partially overlapping roles as (a) co-designers, (b) assessors, (c) consultants, and (d) decision-makers (Chan & Chen, 2023, pp. 1406–1408). As (a) co-designers, students collaborate with staff in developing assessment tasks, criteria and rubrics (p. 1407). This was their most common role in the reviewed studies, accomplished, for example, by brainstorming and co-creating assessment questions, or by developing feedback instruments and suggesting strategies for assessment policies (Chan & Chen, 2023, p. 1407). In the role of (b) assessors, students commonly reviewed both their peers' and their own work, negotiated grades with teachers, and provided feedback on assessment strategies (p. 1407). Furthermore, as (c) consultants, students shared their experience as recipients and users of assessment results to derive improvements for assessment strategies and policies (p. 1407). This can contribute to quality enhancements, with teachers adopting a learner role (Chan & Chen, 2023, pp. 1407–1408). Finally, as (d) decision-makers, students exercise their voice by influencing assessment logistics, e.g. concerning assignment topics, deadlines and other curricular aspects (p. 1408). In practice, partnership often involves students shifting roles even within a single domain, for example by co-creating tasks, voicing their ideas as consultants and contributing to decision-making in assessment design (Chan & Chen, 2023, p. 1410).

By treating students as partners in curriculum and assessment design, educators recognize and encourage students' active role. However, research that simultaneously considers both students' and teachers' perspectives on participatory pedagogies is still rare (Gillett-Swan & Baroutsis, 2024, p. 544). Also, in view of these complex roles and ambitious demands, student

partners might need teachers' support to maximize the benefits of this approach (Chan & Chen, 2023, p. 1411; cf. Nieminen et al., 2025, p. 28). Otherwise, they might feel overwhelmed by their new responsibilities (see Schluer, accepted). In their recent review, Nieminen et al. (2025) acknowledged the potentially "risky nature" of student partnership in assessment (p. 24) characterized by "uncertain outcomes" (p. 10), which contradicts "largely test- and teacher-driven" educational environments (p. 3). Accordingly, they define student partnership in assessment as

> "educator-student relationships where three key principles are visible: reciprocal learning (where educators learn alongside students), meaningful dialogue (that goes beyond mere feedback collection), and uncertain outcomes (indicating a genuine process of discovery)" (Nieminen et al., 2025, p. 4).

While pedagogical partnerships aim to create balanced relations and equal contributions by students and staff, the framework by Chan and Chen (2023) appears to prioritize teachers as trainers, moderators and supervisors of the collaborative processes. They therefore suggested examining the mutuality of the partnerships and assessing the effectiveness of staff-provided support (Chan & Chen, 2023, p. 1411). In fact, students could also function as trainers in the assessment process, for example by providing their expertise about digital tools (see section 5.7.2.1). Such a mutual mentoring in different skill areas might align more closely with the central tenets of true partnerships in assessment design and execution, emphasizing "reciprocal learning" of both learners and teachers (Nieminen et al., 2025, pp. 9, 24; emphasis omitted).

With a focus on the feedback dimension, Matthews et al. (2024) analyzed conversations between teachers and students during a workshop at an Australian university when they discussed the (re-)design of feedback practices. Such co-design approaches can disrupt the "prevalent roles of 'the assessor' and 'the assessee'" (Nieminen, 2022, p. 10, cited in Matthews et al., 2024, p. 28), or the traditional roles of teachers and students, because both contribute equally to the conversation (Matthews et al., 2024, p. 35). The researchers found that not only teachers design opportunities for the development of student feedback literacy, but that "student feedback literacy can also create conditions for the development of teacher feedback literacy" when both share their perspectives and experiences (Matthews et al., 2024, p. 35). Through dialogue and negotiation with students, teachers obtain valuable information on the learning process and progress (Quesada et al., 2019, p. 988) as well as on their own teaching approaches and materials. Students' evaluation of teachers' assessment methods and criteria can ultimately support them in the revision and improvement of their pedagogical design (cf. Gielen et al., 2011, cited in H. Zhao & Zhao, 2023, p. 769). This could also boost teachers' motivation and might even lead to wider changes in the institutional or educational culture (Quesada et al., 2019, p. 997). The eventual outcomes of the learning process depend "on the quality of the relationship between students and teachers", requiring a "substantial shift in mindset" (Matthews et al., 2024, p. 35) that enables genuine collaboration and dialogue.

Apart from participatory teaching approaches, also participatory research processes are gaining in importance, especially in educational fields. They can lead to a deeper and more holistic understanding of teaching and learning processes and will therefore be addressed in the ensuing section.

5.8.4. Participatory Research

To gain multifaceted insights into feedback practices, learners can adopt the roles of co-researchers by engaging in collaborative projects with scholars and teachers (Carless & Young, 2024, p. 11; Matthews et al., 2024). As Carless and Young (2024) explain, "[r]esearchers, teachers and students [would] interac[t] around feedback issues by sharing their diverse, and sometimes competing, perspectives [that] seed the mutual development of feedback literacy" (p. 11). This can be done in smaller-scale studies, such as through the analysis of collaborative workshops held by a limited number of students and teachers (see Matthews et al., 2024), or on a larger scale.

One such participatory research approach is design-based research (DBR), which employs iterative designs to enhance educational practices and advance theoretical understanding (Armstrong et al., 2020, pp. 105–107). Accordingly, its possible outcomes are both theoretical and practical in nature (Armstrong et al., 2020, p. 107; Barab & Squire, 2004, p. 2; A. L. Brown, 1992, p. 142). Practical outputs comprise, for instance, instructional concepts, curricula, learning activities and educational tools (The Design-Based Research Collective, 2003, pp. 5–6). Theoretical contributions include evidence-based claims about learning and adaptable theories that can be applied to specific contexts (Barab & Squire, 2004, p. 11).

The distinction between DBR and the formative evaluation approach adopted in the current study lies in its scope and goals. Formative evaluation focuses on perfecting the design of a particular product or process for a specific educational intervention (The Design-Based Research Collective, 2003, p. 7; cf. Barab & Squire, 2004, p. 5). By contrast, DBR inquires into learning and teaching processes more broadly, taking account of a variety of variables in context, and often generates new theories instead of just testing them (Barab & Squire, 2004, p. 5). Indeed, DBR originated from the recognition that traditional "educational research conducted in controlled, laboratory-like settings" (Armstrong et al., 2020, p. 105) was too abstract for real-world contexts and thus failed to improve teaching practices. DBR researchers like Allan Collins (1990) and Ann Brown (1992) therefore aimed to produce insights that can be transferred to the classroom instead of laboratory settings only (cf. the review by Armstrong et al., 2020, pp. 105–107). In fact, learning is a complex and contextually dependent phenomenon that results from the interaction of numerous factors and should therefore be investigated as such (The Design-Based Research Collective, 2003, p. 6; cf. Barab & Squire, 2004, p. 1).

Consequently, DBR involves an iterative design of learning experiences in complex environments, with multi-sourced and ongoing data collection to refine the design and understand

the efficacy of various features within and across contexts (Crowley, 2016). It employs a variety of quantitative and qualitative methodologies (Collins et al., 2004, p. 39) and draws on interdisciplinary insights (Armstrong et al., 2020, p. 108), including expertise from teachers, curriculum designers, administrators, anthropologists, psychologists and media designers (Collins, 1990, p. 5; Collins et al., 2004, p. 35).

As part of the iterative design, DBR integrates three core processes: (1) analysis and exploration, (2) design and construction, and (3) evaluation and reflection (McKenny & Reeves, 2012, cited in Armstrong et al., 2020, pp. 107–109). During analysis and exploration, researchers collaborate with practitioners to comprehensively understand the problem and learn from existing solutions (McKenny & Reeves, 2012, p. 85, quoted by Armstrong et al., 2020, p. 108). The design and construction phase involves developing and implementing interventions, while the evaluation and reflection phase focuses on constant assessment to identify successful elements and areas needing improvement (Armstrong et al., 2020, pp. 108–109). In that respect, it is crucial to analyze failures, document changes and record the results to guide future iterations (Collins, 1990, p. 5; Collins et al., 2004, p. 34). Accordingly, each iteration builds on previous insights and helps to progressively refine the design (Collins et al., 2004, p. 18). Moreover, a thorough documentation and analysis aids in communicating possible implications and generating theories (The Design-Based Research Collective, 2003, p. 5) to make the findings more sustainable for educational practices (Collins, 1990, p. 5).

Throughout this process, research subjects are viewed as “collaborators” (Armstrong et al., 2020, p. 105), “co-investigators” (Collins, 1990, pp. 4–5) or “co-participants” (Barab & Squire, 2004, p. 3) who collaboratively produce meaningful changes in educational contexts (The Design-Based Research Collective, 2003, p. 6). On the one hand, this collaborative approach ensures that the research is grounded in real-world practice and contributes to enhancing the validity of the findings (The Design-Based Research Collective, 2003, p. 7). Furthermore, it fosters a sense of shared responsibility, with teachers helping to formulate research questions, refine designs, evaluate effects and report findings (Collins, 1990, p. 5). The partnership model also extends to students, who are encouraged to contribute to creating their curriculum (A. L. Brown, 1992, p. 150; see also section 5.8.3 above). In that regard, the pedagogical concept of discovery learning can prove useful, with teachers modelling, fostering and guiding students’ discovery process to promote greater ownership and motivation, which resonates with IBL (Dewey, 1929, cited in A. L. Brown, 1992, pp. 168–169; cf. section 3.2).

Overall, DBR’s partnership approach thus integrates diverse expertise, promotes co-design and co-analysis, and emphasizes the importance of context and collaboration in developing effective educational interventions (cf. Armstrong et al., 2020, p. 107; Collins et al., 2004, p. 21; The Design-Based Research Collective, 2003, p. 7). It could therefore prove valuable for future implementations of the TRC as well as other studies that intend to promote peer learning and digital skills in research planning and other educational contexts.

6. Conclusion

While the importance of supervisory feedback has been widely acknowledged at Master and PhD levels (e.g. Morton et al., 2014, p. A24; T. Wang & Li, 2011, p. 101), the potential affordances of peer feedback for research planning and academic writing have not been studied systematically. In particular, the utilization of digital feedback methods at different stages of this complex process has hardly ever been explored. For this reason, a pedagogical design was developed and implemented that incorporated peer feedback via different digital tools and modalities at successive phases of research planning within an inquiry-based inverted classroom environment.

More specifically, the study investigated how students exchanged and evaluated (1) peer feedback on cloud-based digital boards for finding and refining their individual research topic, (2) digitally recorded peer feedback (audio, screencast) to develop a research design and draft outline, and (3) peer feedback in online forums to comment on each other's screen-recorded project presentations. The research thus concentrated on students' perceptions and practices when engaging with digital peer feedback. Their perspectives as feedback providers and recipients were studied through three formative online surveys. Additionally, their feedback was analyzed in detail, including multimodal analyses of peer feedback on digital boards, audio- and screen-recorded feedback as well as qualitative content analysis of online forum entries. Finally, a summative course evaluation was conducted to assess participants' overall learning gain, also in comparison to previous years.

All in all, the present research thus entered an under-explored field concerning the feedback direction (peer-to-peer), the feedback objects (intermediary products of research planning), the feedback media and modalities (e.g. collaborative platforms, audio, screencast), the pedagogical design (e.g. sequencing of different digital feedback methods within distinct phases of the research process), as well as the triangulation of data from formative and summative surveys eliciting student perceptions and the actual feedback they produced in the context of research planning in postgraduate education.

The comprehensive feedback analyses led to complex category systems addressing linguistic and visual features of the feedback, their contents, purposes and structures as well as students' follow-up (inter-)actions. The surveys shed nuanced light on the feedback providers' and recipients' perceptions, notably their reflections on the tool affordances and limitations as well as their evaluations of the feedback they obtained.

Findings for research question (1) revealed that cloud-based feedback on digital boards was mostly perceived as highly useful, since it seemed to facilitate collaborative brainstorming and interactive exchanges. Even though most participants rated their general familiarity with cloud applications as high, it turned out that students' exchanges would profit not only from dedicated training in peer feedback, but also from awareness-raising about the range of tool

functions that they could seize in a more strategic manner (e.g. layout settings, coloring, audio-visual commenting).

By contrast, with regard to research question (2), students reported limited prior exposure to recorded feedback and also expressed more negative evaluations about the usefulness of the feedback they obtained. In that respect, not only the quality of the feedback contents was decisive, but also an appropriate tool choice and effective utilization of its features. As feedback producers, most of them opted for audio feedback since it was easy to record and allowed for detailed personalized commentary, but as feedback recipients, they deplored a lack of clarity and structure in the feedback messages. In particular, the limited strategic utilization of visual cues in the screencasts points to a need for further training.

As for research question (3), online forums provided a straightforward structure for both feedback providers and recipients but also inhibited interactive dialogue due to a lack of immediacy and emotional nuance. As with digital boards, students did not seize the full scope of functions, notably the multimodal features afforded by these platforms. In terms of vicarious learning and multi-perspectivity, the clear structure of the forums appeared conducive, as peers felt inclined or encouraged to browse other peers' entries. These analyses underscore the importance of paying nuanced attention to sociomaterial factors when creating and implementing pedagogical feedback designs (Chong, 2021; 2022; Gravett, 2022; Nieminen et al., 2022; Tai et al., 2023).

Finally, concerning the overall learning gain in response to research question (4), students expressed a high level of satisfaction. It was even significantly higher than in previous years when the digital peer feedback design had not yet been utilized. Furthermore, the differences in mean scores for both cooperative and self-directed learning were statistically significant ($p<0.05$), which aligns with the course aims of implementing *peer* learning approaches to support students in their *individual* research projects. Eventually, the increase in mean values for the seminar's inspirational nature was highly significant ($p<0.001$), underlining its relevance for the participants' future development as reflective practitioners in the field of TESOL.

Overall, it appeared that digital peer feedback can foster reflection and engagement, but that asynchronous formats may reduce interaction and motivation and should therefore be combined with possibilities for synchronous exchanges, as was done in the current intervention. An adequate pedagogical design is thus essential to maximize interaction and learning, ideally promoting student engagement through all phases of the feedback process, including strategies for feedback seeking and follow-up actions. Moreover, not only tool familiarization, but also training in feedback provision and awareness-raising of the responsibilities in dialogic feedback processes are crucial. This way, the iterative peer feedback design might not only strengthen students' skills in critical reflection, but also support the development of dialogic feedback competencies, and thus contribute to students' professional and academic growth. Altogether, such a student-centered, collaborative approach could promote deeper engagement

in the research process and encourage mutual motivation, which may lead to more sustainable learning processes and outcomes (cf. Carless et al., 2011; Hounsell, 2007).

In particular, partnership approaches that view students and staff as co-creators of pedagogical designs (e.g. Cook-Sather et al., 2014, pp. 6–7; Gillett-Swan & Baroutsis, 2024, p. 534; Mercer-Mapstone et al., 2017) could help to recognize students' specific needs, foster reflection and raise their awareness of the interrelations between feedback purposes, tool choices and the ways in which feedback (inter-)actions can take place. Ultimately, this can increase their engagement and sense of (mutual) responsibility in (co-)shaping the learning, teaching, feedback and research process (cf. Schluer & Liu, 2024; Soltani & Zhang, 2025). Especially in high-stakes contexts of academic research, this approach requires a change in mindset from both students and supervisors (cf. Grohnert et al., 2024; Morton et al., 2014, in section 2.4.2) as well as an open discussion of the perceived challenges and benefits of different pedagogical and technological options. Such a dialogue, however, aligns with current conceptualizations of feedback literacy and student-centered teaching (section 2.2). Feedback is now understood as a socially situated, relational process in which learners play a proactive role in sense-seeking and sense-making as well as in continuously improving their work, supported by interactions with peers, teachers, and technologies. In the end, pedagogies and technologies shape the ways in which peers will interact, as the current study has demonstrated. It is therefore important to help students seize the benefits of peer feedback and peer coaching not only during their studies, but also in their future career. In that respect, the book has outlined several avenues for dialogic, learner-centered and digitally mediated feedback cultures in higher education that recognize the complementary roles of peers, pedagogies, and technologies in fostering academic and professional development.

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