



“Mind Blowing”: Identifying Key Moments in Higher Education Teaching through a Learning Experience Design Framework

ABSTRACT

The characteristics of “good” higher education teaching, especially in digital environments, are increasingly discussed through the lens of sustainable learning. This study investigates key moments that students identify as central to their higher education learning experiences and categorizes them into pedagogical, technical, and social dimensions using the Learning Experience Design (LXD) Framework. Utilizing problem-centered interviews analyzed both deductively and inductively, the findings highlight that the social dimension—including fostering a trusting, low-hierarchy learning environment and engaging in dialectical discussions—is crucial for sustainable learning experiences. In addition, students reported enhanced motivation based on perceived flexibility in choosing learning materials and assessment methods. These results emphasize the pivotal role of social interactions and the learning atmosphere in digital higher education, offering practical insights for promoting deep and lasting learning in higher education didactics.

KEYWORDS

higher education teaching, learning experience design, critical incident, problem-centered interview

INTRODUCTION

The question of what constitutes “good” teaching in higher education is increasingly prominent—particularly amidst ongoing digital transformation. Approaches, such as student participation or deeper learning (typically discussed in the context of primary/secondary education rather than higher education or university teaching), offer opportunities to develop innovative teaching methods. In the domain of online teaching, a technical dimension is added alongside the didactic level. Technical access to learning materials and interaction in the digital space are widely addressed topics. Social interaction within educational contexts often plays a subordinate role in digitally mediated university seminars (Jahnke 2016).

This paper investigates the seminar “Teaching and Learning under the Conditions of Digitalization and Digitality,” which was held repeatedly over several semesters in slightly varying online formats (Lohner, Mau, Albrecht, and Stumpf 2020; Lohner 2021). A detailed analysis and reflection on the didactic design in the context of the concept of deeper learning (Sliwka and Klopsch 2022) can be found in (Lohner, forthcoming).

The aim of this study is to identify the specific types of learning experiences and interactions that students perceive as central (“key moments”) to effective or “good” teaching within higher education. Students evaluated the seminar as “very good” in institutional quality assurance across

multiple semesters. For the purpose of this study, in addition to didactic and technical characteristics, social attributes are also examined using the Learning Experience Design (LXD) Framework described in Schmidt, Tawfik, Jahnke, and Earnshaw (2020).

The premise is that such key moments are memorable, persisting weeks or months after course completion, and are connected to learning content—qualities that reflect sustainable and lasting learning. Specifically, this research addresses two main questions:

- (1) What types of experiences or interactions do students identify as pivotal to “good” teaching in the seminar?
- (2) How do these key moments correspond to the pedagogical, technical, or social dimensions of the LXD Framework?

Other scholars may use the insights from this study to intentionally plan future courses based on the LXD Framework and to hopefully generate key moments strategically in order to ensure sustainable learning. In this way, higher education teaching would achieve its self-imposed goal of attaining relevance beyond the time of examination and conveying content to students in a manner that remains present and retrievable long after their studies.

The following literature review first situates the research in the German higher education context, then examines foundational ideas related to sustainable learning, social processes in digital teaching, and the Learning Experience Design framework.

LITERATURE REVIEW

The foundational elements relevant to this study lie within various strands of research focused on higher education. These include German-speaking higher education didactics and considerations on how learning can be designed so that the acquired knowledge remains usable in the long term. At its core is the LXD Framework, which uniquely incorporates the social dimension of online learning environments.

German higher education

Scholars approach higher education from various perspectives, often depending on the discipline or regional peculiarities of their respective systems. Since the author conducted these interviews within the context of the German higher education system, the context of German-speaking “Hochschuldidaktik” (often translated as “academic development”) plays a significant role. *The Handbook of Academic Development* by Kordts-Freudinger et al. (2021) constitutes a comprehensive reference work, spanning over 600 pages, that systematically addresses a range of themes central to German-speaking higher education didactics—including curriculum design, methods of teaching and learning, assessment, faculty development, and institutional policy. Given the breadth and depth of topics covered, the handbook serves as a foundational resource for scholars and practitioners interested in the German academic development context. For readers seeking a more concise orientation, the book review by Siegel and Lohner (2023) offers a summary of the handbook’s key themes and serves as a quick entry point for international audiences wishing to gain an overview of the German higher education landscape.

In Germany and globally, the concept of Constructive Alignment (Biggs 1996; Biggs and Tang 2011) guides course and curriculum design. This model can be described as a triangle: learning outcomes, teaching and learning methods, and assessment forms are the three main points. These three elements must be aligned in order to create a successful learning process. The Constructive

Alignment model is closely associated with the constructivist learning theory, which focuses on linking learning content to new knowledge construction. Constructivism views learning as an active process in which the learner integrates new knowledge elements into their existing constructs based on prior knowledge and strengthens their understanding of the world.

While the learning theory describes *how* people learn, the focus for didactic decisions according to Constructive Alignment is usually oriented toward *what* should be learned or taught; what should be assessed; and what teaching and learning activities connect these elements?

Although Constructive Alignment is a global model, its application in the German context is complemented by traditions such as the Humboldtian ideal of *Bildung*, which aims for the holistic development of individuals—not only knowledge acquisition but also the cultivation of values and competencies (Ulrich 2016). Thus, the focus is not exclusively on subject content and the accumulation of knowledge but also on soft skills or key competencies. In competency orientation, the definition of “competencies,” according to Weinert (2002), is frequently cited in German-speaking areas. It includes not only skills and abilities but also attitudes and values. Ulrich and Heckmann (Ulrich and Heckmann 2013; as cited in Ulrich 2016) define “good higher education teaching” partly with the goal of graduating students as “mature, competent, and value-grounded citizens,” incorporating “the latest higher education didactic research findings.” Thus, personal development is a fundamental objective of higher education alongside the acquisition of subject-specific knowledge. This dual emphasis distinguishes the German approach to higher education didactics; instructional planning is attentive to both tangible academic skills and broader personal development.

Learning for the future

Formal educational processes are typically time-bound (e.g., an undergraduate degree usually takes three years, followed by two additional years for a master’s). To ensure that educational goals have an impact beyond this period and, in the Humboldtian sense, also shape society, educators must orient the learning process toward conveying learning content in a manner that remains retrievable or applicable over a long period. Ben-Eliyahu (2021, 4–6) describes the concept of Sustainable Learning in Education (SLE), which consists of four central dimensions:

- Renewing and relearning: The ability to revisit, update, or adapt previously learned knowledge or skills.
- Independent and collaborative learning: Developing both autonomous learning practices and effective cooperation with others.
- Active learning: Emphasizing engagement, experimentation, and participatory activities as a pathway to long-term understanding.
- Transferability: Applying learning to new, varied, or real-world contexts, bridging theory and practice.

In these four areas, sustainability is not understood in the ecological sense but as an aspect of learning that can have a positive impact on learners and their future environments—primarily because learners are enabled by what they have learned to adapt to new circumstances in a changing world and actively shape it. Transferability manifests in concepts like Deeper Learning (Sliwka et al. 2022), which are currently more widely discussed in primary/secondary education in Germany but are gradually finding their way into universities.

A key challenge is identifying which moments or experiences in a course are most likely to endure in students’ memories and to influence their future actions. The Critical Incident Technique (CIT) (Flanagan 1954; Woolsey 1986) helps pinpoint such moments by gathering detailed accounts

from participants about events they found particularly notable or formative in a given learning environment. The technique does not automatically equate to sustainable learning but is a tool to reveal memorable, impactful teaching and learning incidents. For example, interpersonal interactions significantly shape satisfaction in higher education (Douglas, McClelland, and Davies 2008), and students often cite social dynamics as “critical incidents” during their studies (Panadero and Monereo 2017).

Social interaction in online multimedia learning formats

Since the COVID-19 pandemic, online learning has become ubiquitous in higher education (Skulmowski and Rey 2020; Zawacki-Richter 2021). When digital media are involved in learning processes, technological decisions arise alongside pedagogical or didactic planning: Which tools are used for the learning process, and how are learning contents prepared and presented digitally? The planning of media design can utilize theories such as Cognitive Load Theory (Sweller 2005) or the Cognitive Theory of Multimedia Learning (Mayer and Moreno 2003). These focus exclusively on the media design of learning content to support pedagogical or didactic considerations in order to ensure successful learning. For the technical implementation of digital teaching and learning scenarios, established heuristics from usability design can be useful (Nielsen 1994; Nokelainen 2006). Combining these heuristics with the implications of both mentioned theories result in learning material that is well designed and easy to use. Especially in public institutions, where purely online offerings are rare despite all efforts regarding the use of digital media, learning remains a social process (Lave 1996; Salomon and Perkins 1998). Therefore, the social dimension should also be considered when describing or evaluating the quality of a pedagogical intervention or teaching event that is technologically implemented.

The Learning Experience Design (LXD) Framework

Schmidt et al. (2020) developed the Learning Experience Design (LXD) framework to provide a holistic lens for designing and evaluating technology-enhanced learning environments. Unlike models that focus solely on pedagogical or technological elements, the LXD framework explicitly incorporates the social dimension—emphasizing that learning is not only about content and tools, but also about interactions among participants.

Drawing on principles from user experience research, Schmidt et al. (2020) systematically reviewed and synthesized 100 evaluative items from existing instruments, organizing them first into categories, then in the framework’s three main dimensions: social, technological, and pedagogical (see section “Coding and analytical framework” below). The **pedagogical** dimension addresses instructional design and alignment with learning objectives, the **technological** dimension pertains to the usability and functionality of digital learning tools, and the **social** dimension encompasses communication, collaboration, and the learning climate—both online and in blended settings. The authors also introduce a **meta-category** to capture overarching themes and insights that transcend these individual dimensions. This meta-category includes elements such as the alignment between designer and learner models, epistemology, and the added value for teaching. It serves to highlight connections and synergies between the categories, offering a holistic perspective on the learning experience that can lead to profound insights and comprehensive strategies. The approach underscores that the usability of digital tools should support both pedagogical intentions and social connections. Their recommendations stress designing user-friendly technologies, adapting instructional strategies to diverse learning situations, and intentionally fostering interaction and collaboration among learners.

The LXD framework offers practical guidance for educators and researchers who aim to create digital and hybrid learning experiences that are engaging, socially supportive, and pedagogically effective. By balancing social, technological, and pedagogical considerations, the framework helps ensure that digital teaching environments support holistic and meaningful student learning.

In summary, the literature highlights the complexity of “good” teaching in digital higher education and emphasizes the need for approaches that integrate all dimensions of the LXD Framework. Guided by this, the next section describes the qualitative methodology used to investigate students’ most memorable learning experiences within the seminar.

METHODOLOGY

This research adopts a qualitative approach, using problem-centered interviews as developed by Witzel (1982; 2000), to explore the types of experiences students recall as most influential during the seminar. This approach is well-suited for uncovering “critical incidents” that shape student perceptions of teaching quality and for allowing flexibility to address individually meaningful experiences that may not be captured through standardized questionnaires. Hiller (2009) also combined this interview style with the identification of critical incidents.

About the seminar and the study participants

The seminar is an elective course offered within the education and teacher certification programs at Karlsruhe Institute of Technology (KIT). It is structured around digital didactics and the implications of digital transformation in educational practice. Across three semesters, the instructor delivered the course in a mixture of blended and fully online formats, adapting to pedagogical goals and changing pandemic conditions. The seminar addresses topics relevant to the design of digital education in general. These include practical guidance on digital tools and techniques, methods for enriching teaching with digital elements, and discussions about the advantages, disadvantages, and societal implications of using digital technologies in education. The course also explores the importance and impact of open educational resources and the sharing of such materials for quality assurance within the educational system. Special emphasis is placed on presenting these topics as practically as possible and involving the students by encouraging them to contribute examples from their own educational biographies whenever appropriate.

Of the 156 students who attended the seminar (2019–2023), 11 students agreed to be interviewed. Four students attended the course in the winter semester of 2019/20 when the seminar was first conducted as a pilot. Four additional students attended the seminar a year later in the winter semester of 2020/21 after the instructor completely converted it into a virtual teaching concept due to the COVID-19 pandemic. Three more students attended it in the summer semester of 2021. Two respondents identified as male, and nine identified as female. The significant gender imbalance reflects the situation in the degree programs where the course took place (Education and Teaching Certificate). The interviews lasted an average of 29.6 minutes. Students participated in the interviews voluntarily and were not compensated. All interviews took place in February 2022, ensuring that participation in the course was at least one semester in the past before the interview; this reinforced the preceding premise for long-term memorable moments or learning-outcomes (see introduction).

To recruit interview participants, the instructor contacted all seminar participants from previous semesters via email and asked if they wished to discuss their attendance of the course. The instructor kept the request deliberately vague to prevent students from preparing for the interview, repeating course content, or recounting seminar activities. The instructor invited students who responded to this email to select an appointment for their interview from a list. They signed a consent

form and data protection agreement in advance, allowing the interviews to be conducted and recorded via video conferencing software.

Informed consent

Prior to participation, all interview participants provided written informed consent.

Problem-Centered Interviews: Rationale and procedure

The Problem-Centered Interview, developed by Andreas Witzel (2000), is a qualitative method designed to generate contextually rich and analytically valuable accounts of complex research problems. Closely aligned with theory-driven methods such as Grounded Theory (see Hunger and Müller 2016), the method is characterized by combining inductive and deductive approaches; intertwining theoretical expectations with the themes that naturally emerge from participants' narratives leads to insights (Witzel 2000, 3).

In the Problem-Centered Interview, a semi-structured conversation develops between interviewer and interviewee. The interviewer encourages the participant to reflect on relevant experiences, initially through open-ended questions and, as the dialogue progresses, by introducing targeted, theory-informed prompts. The typical process unfolds in four stages:

- (1) Participant situation and problem definition: The interviewer begins with open-ended questions about the participant's background and perspective on the central research problem.
- (2) Material stimuli: Optional prompts, such as short scenarios or vignettes, deepen the discussion.
- (3) Theory-informed questions: The interviewer introduces questions drawn from existing theory to clarify or extend earlier responses.
- (4) Case-specific recap: The interview concludes with a synthesis, allowing the participant to verify or elaborate on the summary.

The interviewer in the PCI is an active facilitator who offers expertise, clarifies ambiguities, and draws connections, all while remaining attentive and responsive to the participant's narrative (Witzel 2000, 8). Witzel recommends that interviewers be deeply familiar with both the research topic and the participants' context. The method involves initially transcribing interviews and performing a theory-driven, deductive coding. In this study, the researcher based the coding on the three main dimensions of the LXD Framework (Schmidt et al. 2020, 135). During the analysis of the interviews, the researcher inductively incorporated new themes into the coding. Subsequently, case descriptions or dossiers were created for each conducted interview, highlighting central themes and peculiarities. The researcher then conducted a systematic case comparison on biographical or demographic characteristics.

Coding and analytical framework: Applying LXD

For coding, the instructor used the main categories from Schmidt et al. (2020, 134; Table 2) describing the LXD Framework:

- (1) Social: This includes all interpersonal and social aspects of a media-implemented teaching and learning scenario. Subcategories are collaboration, communication, roles/relationships, and sociality/social interactivity.

- (2) Technology: Primarily concerns the 10 usability heuristics named by Nielsen (1994) but also elements such as navigation, learnability, and prevention of cognitive errors.
- (3) Pedagogical: Pertains to aspects related to the pedagogical and didactic design of the teaching and learning scenario. This includes learner activities, learner context/motivation, and learner control when regarding learners. Additional subcategories of this dimension concerned learning objects, including assignments/tasks, goals/objectives, assessment, content arrangement, and organization of learning material.
- (4) Meta-category: Describes aspects such as the epistemological understanding of teaching and learning, the added value of digital media for teaching, the objectivity of content, and the alignment between learners' needs and the underlying teaching model.

Following the typical process for problem-centered interviews, the researcher deductively based the interview coding on these categories and afterwards analyzed inductively for emerging new categories. Unlike the main categories (1 through 3), which focus on direct interactions or features, the meta category (4) covers broader reflections on teaching and learning. This includes how well the course design fits student needs, overall added value, and views on learning itself. In this study, the researcher deductively coded the meta category to capture statements where students talked about the bigger picture or how the seminar connected to their own ideas about good teaching.

During analysis, the researcher coded all encounters and experiences described in interviews to these preset categories. Novel subthemes emerged, such as “fear and trust” (added to the social dimension) and “dialectical presentation of content” (added to the pedagogical dimension), based on recurrent patterns observed in student responses. These two inductively formed categories are not part of the models or the dimensions analyzed and incorporated into the LXD Framework by Schmidt et al. (2020). These are new categories, the meaning of which is explained in greater detail in the discussion section.

Potential biases and reflection on methodology

The dual role as researcher/interviewer and instructor of the seminar potentially limits the validity of the findings. Additionally, students voluntarily responded to the request, suggesting a strong focus on students who may have certain sympathies or particularly positive memories of the seminar or instructor. However, since this work is embedded in the larger context of an autoethnographic doctorate, this perceived limitation presents an opportunity to examine precisely this situation in which the roles of researcher and teacher coincide: For autoethnographic works, Reinmann and Schmohl (2016) emphasize that higher education didacticians as researchers and practitioners occupy a special and unique position to investigate certain phenomena. At the same time, the nuanced consideration of both inward and outward perspectives poses a special challenge for researchers.

In the LXD Framework, the social component stands on equal footing with the technological and pedagogical dimensions. In other models for designing teaching and learning processes with digital media, this social component is absent (Jahnke 2016), making the social interconnectedness of relationships between students and instructors of particular interest and contributing to the autoethnographic approach of the overarching research project. To minimize the existing power imbalance between instructor and students, the interviews took place after all course assessments, which the author, as the instructor of the seminar, had evaluated. As an interviewer, the author had no opportunity to influence the students' academic progress after the interviews.

The outlined methodological approach enables a nuanced exploration of the seminar experience from the student perspective. The following section presents the interview findings, systematically organized according to the LXD framework and supported by illustrative excerpts from interviewees.

RESULTS

Regarding the research question on which dimension of the LXD Framework key moments for successful teaching are found, frequent mentions or particularly striking descriptions of specific aspects of the seminar across multiple interviews can provide insights into how and why these moments occur.

Summary of coding and key moments

To provide a structured overview of the qualitative coding process and the centrality of particular themes, Table 1 summarizes the prevalence of references for each dimension of the LXD Framework, lists major categories, and highlights key inductive themes from the student interviews. The numbers indicate how many times students referenced each theme across all interviews, providing insight into which aspects of the seminar the students found most salient. Categories marked with an asterisk (*) represent themes that the researcher identified inductively in the analysis and constitute additions to the original LXD framework.

For each category, the author included an illustrative student statement. Not all LXD categories were equally prominent in the data; students referenced some, such as “roles and relationships” or “learner motivation,” frequently, while others appeared only rarely or not at all. This distribution reflects the participants’ natural focus and highlights the dimensions of learning students found especially relevant in this seminar context. Student quotes are presented in English, translated from the original German by the author to closely preserve tone and intention.

Table 1. Overview of LXD dimensions, selected main categories, and frequency of references in student interviews

LXD dimension	Main category	No. of references	Example student quote
Social	Roles and relationships	27	You really were my very first lecturer whom we could, somehow, address by first name and use ‘du’ with. That alone changed a lot because it brought in something personal. So, you actually were much closer to us than any of the other lecturers I’ve had so far in my studies.
	Communication	15	Actually, I thought the most important part was to talk about it with others—or, in general, to exchange ideas, maybe even to have a discussion.
	Fear and trust (*)	12	You don’t feel like you have to prove yourself, or approach the lecturer in a kind of ‘anxious’ way and be careful about what you say because you’re afraid it might affect your grade.
Technical	Usability (UX) / visual design	11	The way the LMS course was set up was really something completely different from what I was used to. Normally, there’s nothing in there, or maybe just two PDF documents or something like that. And that really did spark my interest.

Pedagogical	Learner context, motivation	21	You always did these intro videos at the beginning, and those intro videos were so motivating—that's what all of us in our group, the one I attended the seminar with, said.
	Dialectical presentation of content (*)	9	I think, above all, what I generally take away from my studies is to look at different perspectives and different methods or approaches—and not to always just stick with myself or with what I already know.
	Assessment	5	I really liked that you could actively decide: Okay, how do I want to show my achievements? What do I like better, or where do I see myself more? Do I want to create something or come up with something on my own? Or would I rather gather information and present it in a smart way, like in a poster? I really thought that was great, having this option to choose.
Meta-category	Match: designer and learner models	6	We really had a different topic every week, and that led to quite open discussions in the seminar. I thought that was very good, because that's exactly how I imagine a seminar should be structured.

Technical (user experience) dimension

In the LXD framework, the technical dimension includes practical features of the digital environment as well as students' user experiences. Students in this study rarely spoke about technology in a strict sense, such as tools or software problems. Instead, they highlighted the clear structure and design of the online course space and how easy it was to find materials. These are elements of user experience (UX), which interviewees found more important than technical complexity. For this reason, the technical dimension in the findings focuses mainly on design and usability. The implementations of the seminar under investigation involved blended learning scenarios or purely online offerings, meaning students expected the virtual learning environment to play a significant role. The university offers various tools for conducting online learning offerings: the learning management system "ILIAS," an open-source system in use for over 10 years, and video conferencing software, such as Microsoft Teams and Zoom. Students described these video conferencing tools as "normal," assigning no particular significance to them or their specific features.

In contrast, students described the learning management system positively, particularly highlighting the visual design and clarity of the course space. These aspects—such as user interface, navigation, and the consistent visual organization of course materials—fall under the technical dimension, as they are tied directly to the possibilities and limitations of the learning management system. Students reported that they found this design fundamentally different from that of other instructors, making it easier to orient themselves and access learning resources (see Table 1, usability/visual design). Furthermore, interviewees considered the consistent structure of the provided learning materials for each learning unit helpful, as it offers easy orientation. The regular reflection tasks that students completed each week, accompanied by automatically assigned peer feedback, provided helpful anchors for managing their time for pre- and post-preparation of the course.

These design considerations—related to the layout, usability, and structure of the learning management system—are specific to the technical dimension. They do not refer to underlying didactical or instructional strategies, but rather to how the technical system frames and makes accessible the pedagogical choices. Had the instructor used a different technical infrastructure or

platform, the visual and organizational features could have differed significantly. For this study, the researcher therefore analyzed these design qualities in terms of their technical, rather than purely pedagogical, impact.

Beyond these points, the students mentioned no aspects related to the technical design of the seminar.

Social dimension

Almost all interviewees addressed the same categories for the social dimension, which could be expanded by an additional category (“fear and trust”). The students frequently, positively, and overwhelmingly mentioned that the instructor allowed students to use the informal address (“Du”) and to address everyone by their first names (see Table 1, roles and relationships). Students observe that this contributed to a “relaxed atmosphere” that makes learning in the seminar pleasant. This led to students perceiving communication between the instructor and students as “on equal footing,” and they described the hierarchical gradient as flat.

Students also mentioned that the discussions during the seminar, a main component of the synchronous sessions either in person or online, in a positive light (see Table 1, communication). Students noted that exchanging ideas with individuals outside their usual peer group enhanced their learning and introduced them to new perspectives. In two implementations of the seminar, this exchange also took place via Twitter, allowing external actors to be involved, which occurred outside the usual learning environment.

Fear and trust

Students discussed the newly formed category “fear and trust,” assigned to the social dimension in the LXD Framework, in such a way that they cited the aforementioned aspects (communication on equal footing, informal address using first names). Many interviewees stated that they felt free from fear when speaking to the instructor in the seminar due to these aspects. In other teaching contexts, they were concerned with offering incorrect or unfavorable opinions that might negatively impact their academic performance (see Table 1, fear and trust). However, in this seminar “unfinished thoughts are allowed” and are valued, picked up, and integrated into the broader context of the course content.

Students also highlighted the positive perception and appreciation of personalities/ They described how the instructor actively participated in group work discussions introducing new information or perspectives, as extremely unusual but pleasant. The instructor’s interest in students beyond the course (e.g., by inviting them to voluntary excursions or explicitly engaging with the students’ environment, as seen in the camera view of the video conference) is described by students as a welcome change compared to other courses. One student emphasized that they appreciated the humorous self-reflection in the form of outtakes in the instructor’s short introductory videos. He described it as a moment that he and his peers looked forward to every week.

Pedagogical dimension

The students addressed the most diverse array of topics for the pedagogical dimension of the LXD Framework. They most frequently mentioned that the provided learning materials were multimedia (see Table 1, learner context, motivation) and varied: Students sometimes had the freedom to choose whether to engage with all media when preparing a seminar session or only a selection. The formats included short articles from personal blogs, longer academic texts, videos, such as academic lectures, or lengthy podcast episodes that discuss the seminar topics in detail.

Students appreciated the podcast format in particular, because audio content can be conveniently consumed “on the side” of daily life. Only one student mentioned that this “on the side” consumption presents the challenge of taking notes due to repeatedly interrupting parallel activities.

These freedoms of choice extend in the seminar thanks to flexible formal guidelines for assessment; according to the students, they appreciated the ability to choose the assessment type themselves (see Table 1, assessment). They could decide, based on their interests and abilities, whether to write a text or create multimedia content on a specific topic.

Overall, the interviewees also appreciated the blended-learning format of the seminar. Students appreciate the flexibility to prepare for synchronous sessions (in person or online) from home and then align their knowledge through discussions in the seminar.

Dialectical presentation of content

Additionally, the pedagogical dimension could be supplemented by a category not previously present in the LXD Framework: “dialectical presentation of content.” In the social sciences—in contrast to the natural sciences—there are sometimes controversial discussions supported by different evidence, particularly in educational sciences. The instructor selected specific contributions that examined the same topic from different perspectives, forcing students to listen to both sides and form their opinions, which they also had to defend in seminar discussions. The students positively evaluated this cognitive challenge, which some reported led to a personal “rethink” (see Table 1, dialectical presentation of content).

Finally, students reported that they learned new content in the seminar that can be directly reflected in their teaching or learning practice or their future professional practice (teaching certificate). One student described this experience as “mind blowing, just mind blowing,” referring to the realization that he previously, without noticing, had no touchpoints with the subject matter and had since recognized that they encountered seminar topics daily within their learning context.

Meta category

Interviewees mentioned the meta category less often than the other dimensions, though it still played a role in how students viewed the seminar. Students referred to the overall match between the course’s design and their own learning preferences, as well as to the general purpose behind how content was chosen or taught. The researcher found only a few statements in the interviews. On one hand, a student described the figurative language and reference of the seminar’s title or individual sessions to pop-cultural phenomena as “cool.” Additionally, two students noted that the seminar format and the transparency regarding learning objectives or the purpose behind the selection of learning content aligned with their concept of an “ideal course” (see Table 1, match: designer and learner models).

Together, these results identify which aspects of the seminar the students found most impactful, and how these key moments align with or extend the LXD framework. The discussion section interprets these findings with reference to existing literature and theory, drawing out their implications for both scholarship and practice.

DISCUSSION

The analysis of student statements through the lens of both the LXD framework and new identified categories, uncovering nuanced insights into what constitutes impactful teaching in digital higher education—particularly as experienced in a German seminar but with clear implications for international practice.

For the **technological dimension**, which this article addressed the least, aligning with Nielsen's heuristics (1994) is a good way to make learning environments accessible. The consistent structure of content across multiple learning units helps students navigate the learning environment and creates a sense of security. The visual design of the learning environment also appears to contribute to the positive assessment of the seminar: Students described the design, especially in comparison with other seminars, as successful. To some extent, the novelty effect (Clark and Sugrue 1991) might be a cause, leading to increased motivation to learn due to innovative environments. However, to dig deeper into this aspect, an analysis of additional (specifically other) courses would be necessary, which is not within the scope of this study.

Regarding the **social dimension**, the atmosphere created in the teaching event significantly contributed to its positive perception among learners. The use of informal address ("Du") and first names as the main reason for closeness and communication on equal footing possibly aligned with the habits of younger generations. Here, the contrast with other courses and instructors seemed to exist but was more implicit. The interview participants in the study mostly attended the seminar during the COVID-19 pandemic with contact restrictions in place. Relaxed communication possibly met the desire and need for social exchange in a special way during this period (Lohner, Mozer, and Schmid-Walz 2021; Autor:innengruppe AEDiL 2021; Ternes et al. 2022). However, the same assessments are also found among interviewees who attended the seminar before the pandemic. Even with the cohort from the more recent past, when no contact restrictions were in place and the seminar's synchronous sessions still took place online, there was a particular appreciation around how to handle communication.

The analysis of the interviews identified a new category that is not included in the LXD Framework: "fear and trust." This deliberately named contrasting pair describes students' statements concerning both the relationships among themselves and with the instructor, as well as those related to other seminars. As students were all studying different subjects and only converged for the educational science part of their teaching certification studies in this seminar, this category was not associated with a specific discipline. The statements in this category not only shed light on the investigated course but could be a barometer of the communication culture at the entire university (in teaching disciplines). Verbal expressions in seminars—even those designed for discourse and exchange—were always associated with performance pressure, and students feared making incorrect statements. Trust can be established in various ways. In this regard, one can distinguish among an affective-based, a cognition-based, an identity-based level, and values-based aspects (Felten, Forsyth, and Sutherland 2023; Moore, Miller, Longmire-Avital, Hall, Ewell, and Wyatt 2025). The question arises whether students are the correct target group to eliminate these fears, or whether it is the manner of communication by instructors in other seminars that causes these concerns. Alternatively, misunderstandings due to existing hierarchies in studies and dependency relationships might have existed. Further studies or a comprehensive analysis of existing evaluations of other courses could provide insights.

For the **pedagogical dimension** of the LXD Framework, versatility in different contexts had a positive impact on the learning experience. The selection of offered learning materials motivated students to engage with the course content. They could choose when and in which media mode (audio, video/image, text) to learn from. Certainly, the seminar benefited from its focus on topics (digitalization of education) that were at the center of attention in both science and society due to the COVID-19 pandemic. The multimedia learning content, from which selections can be made based on didactic considerations, might have been less extensive in other study disciplines. However, students

appreciated engaging with seminar content according to their individual and situational learning preferences (Deale 2019).

Additionally, within this dimension, the interviews revealed a new category: “dialectical presentation of content.” This category was assigned to sections in the interviews where students expressed that discussions in the seminar were highly controversial, without a “right” or “wrong” side. As previously described, in the social sciences, particularly in educational sciences, there are topics for which science (still) does not provide clear-cut results—and perhaps never will. These discussions took place in the seminar in a sometimes lively manner and posed a significant cognitive challenge for students: Existing prior knowledge and personal attitudes and stances were put to the test and aligned with new insights and competing attitudes and stances. This demonstrates how the constructivist approach concretely manifested in active learning behavior. Chaves (2007) also described dialectical processes as vehicles to achieve learning transfer. Further, both the free selection of learning materials for individual preparation and the collective, intensive engagement with controversially discussed content promoted independent and collaborative learning (Ben-Eliyahu 2021). These results extend previous literature by illustrating that, beyond technology and pedagogical design, social trust and dialogic challenge are not merely desirable, but essential to students’ perceptions of “good” and lasting learning within digital settings.

In considering the **meta category** in the LXD Framework, the seminar contributed to some students reflecting on their learning and teaching. Establishing connections to teaching practice, i.e., the students’ future career goals, facilitated the transfer of learning content into the students’ life world, even if this occurs in the future. Regarding the overall aim of the studies—to become teachers—this reflection on the bigger picture, namely how teaching and learning can take place under the conditions of digitalization and digitality (digitality, as defined by Stalder (2016)), is possibly the most important learning outcome of the seminar.

The application of the LXD framework proved largely effective for organizing and interpreting student perceptions. While the author did not find all elements from the framework in coding, the main dimensions—and the identification of new inductive categories—validated the model’s flexibility for both designing and assessing digitally-supported seminars. At the same time, the emergence of the “fear and trust” and “dialectical presentation of content” categories extends LXD to better account for the affective and epistemic dynamics of university learning. While these findings resonate with other SoTL research, they are limited by the single-institution, small-sample, and pandemic-era context; further comparative studies could test the generalizability of social trust and flexible learning design across cultures, disciplines, and platforms. It is again noteworthy that the seminar took place in an interdisciplinary part of the teaching certification studies and aimed not only for subject-specific competencies on the topics of digitalization and digitality in education but also for interdisciplinary competencies in personal development. The seminar’s content allows the implementation of the proposed recommendations, which certainly do not apply to all subjects and disciplines.

Future work could apply comparative sampling or combine qualitative and quantitative approaches to explore the durability and learning impact of these “key moments” over time.

Together, these findings demonstrate how the LXD framework serves as an effective lens for analyzing and understanding the multifaceted nature of impactful learning moments in higher education. The following conclusion distills the key insights and offers recommendations informed by this framework and the broader literature.

CONCLUSION

Successful learning environments rely on social interaction, especially informal and private opportunities to engage with other learners; these exchanges are vital for enhancing collaboration in seminars (see also Wheele, Lindkvist, Weber, Haugen, and Windlinger 2024). In the present study, an active design of the learning atmosphere contributed to a positive experience for learners, regardless of whether a course included synchronous phases online or offline. In addition to immediate communication, the new category “fear and trust” also indicated that the communication culture within an educational institution should be considered when assessing teaching quality: Educational institutions should aim not only to offer individual courses but to provide the entire range with the best possible quality. Ultimately, fostering psychologically safe, flexible, and dialogically rich spaces may be key to realizing the deeper, more sustainable learning sought in digital higher education—in Germany and beyond.

The pedagogical dimension of the LXD Framework was also characterized by frequent mentions of specific elements, particularly the flexible selection of multimedia learning content for seminar session preparation. The same applied to the type of assessment for examinations. Moreover, the new category “dialectical presentation of content,” i.e., the active controversial engagement with learning content, which occurred on the subject-matter level and required the evaluation of one’s own values and attitudes, emerged as a key moment of good teaching. From the insights gained, the author derived recommendations that extend those provided by Schmidt et al. (2020, 137) in these two dimensions:

For the social dimension:

- Communicate with learners on an equal footing in order to create a pleasant learning atmosphere for everyone.
- Adopt an appreciative attitude toward all opinions and clearly separate subject-matter level from personal attitudes.

For the pedagogical dimension:

- Provide learning materials in various (multi-)media formats and create options for selection.
- Create space for personal involvement, where possible, to critically examine values and attitudes related to the learning subject.

Even though the seminar’s topic was the digitalization of the educational system and its format explicitly incorporated digital elements, students most often cited non-digital, social, and relational qualities as core indicators of teaching quality. This outcome resonates with the LXD framework’s emphasis on balancing technological, pedagogical, and, crucially, social dimensions, highlighting how effective digital course design depends on more than just innovative tools or content. As Williamson, Macgilchrist, and Potter (2024) argue, the mere adoption of technology without contextual or relational grounding risks creating a contextless learning experience. Meaningful context emerges through the collaborative engagement of students and instructors—a process rooted in the social and pedagogical dimensions articulated by the LXD framework. Ultimately, the key moments identified in this study are not accidental; they reflect intentional didactic choices that align with the integrative philosophy of the LXD model and can be systematically incorporated to enhance the quality of digital teaching and learning.

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DISCLOSURE

The author declares no competing interests. They used GPT technology to help translate sections from German to English.

ETHICS

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