Pensamiento Educativo, Revista de
Investigación Educacional Latinoamericana
Agosto 2024, Vol. 61, N° 2, pp. 1-12
DOI: 10.7764/PEL.61.2.2024.6

www.pensamientoeducativo.uc.cl

FACULTAD DE EDUCACIÓN
PONTIFICIA UNIVERSIDAD
CATÓLICA DE CHILE

Promoción de la enseñanza dialógica en la práctica profesional: estudio cuasiexperimental de las percepciones docentes del uso de videos y simulaciones[1]

How to Promote Dialogic Teaching During a Field Experience: A Quasi-Experimental Study of Preservice Teachers' Perceptions of Video- and Simulation-based Learning

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RESUMEN

Los programas de formación inicial docente se enfrentan al desafío de cómo desarrollar competencias docentes que vinculen la teoría y la práctica. El enfoque de prácticas generativas resulta pertinente al identificar prácticas clave y pedagogías para promoverlas. Esto incluye el uso de aproximaciones para simular prácticas en entornos protegidos. Estas pedagogías suelen requerir una inversión sustantiva de tiempo e, incluso, la reestructuración completa de los cursos universitarios correspondientes. Esto plantea las interrogantes de si las simulaciones pueden ser útiles en contextos menos intensivos y cómo son percibidas por los estudiantes. En este artículo se presentan los resultados de un estudio cuasiexperimental con estudiantes de un programa de formación inicial en Alemania. En el estudio se desarrolló una nueva simulación de enseñanza y se comparó con el análisis de videos de aula. Ambas condiciones se aplicaron en un seminario universitario de acompañamiento de una práctica profesional enfocado en el diálogo productivo en el aula. El objetivo de esta investigación es evaluar la nueva simulación, en la que un profesor en formación debía ensayar la realización de un diálogo productivo en el aula. Esta fue grabada y analizada colectivamente (n=180 estudiantes). El grupo de comparación analizó videos de profesores desconocidos que ejemplifican la enseñanza dialógica (n=100 estudiantes). Las preguntas de investigación se centran en las percepciones de aprendizaje y de autoeficacia de los estudiantes, abordadas mediante cuestionarios pre-post. Los resultados indican que los participantes de la simulación se diferenciaron significativamente del grupo que utilizó videos por sus percepciones más positivas del entorno de aprendizaje, la adquisición de conocimientos y la intención de aplicarlos. Ambos grupos exhibieron el mismo nivel de autoeficacia para implementar el diálogo en el aula, sin un efecto de interacción significativo a favor del GI. La discusión aborda los resultados favorables de la intervención. Se consideran estos hallazgos en relación con investigaciones previas sobre el aprendizaje de la enseñanza en una práctica profesional. Se problematiza la falta de cambios en la autoeficacia, tomando en cuenta limitaciones y aspectos relevantes para futuras investigaciones.

PALABRAS CLAVES:
prácticas generativas; docentes en formación; enseñanza dialógica; práctica profesional; formación docente

KEYWORDS:
core practices; preservice teachers; classroom dialogue; field experience; teacher education

Fecha Recepción
04 de diciembre 2023
Fecha Aceptación
21 de junio 2024

ABSTRACT

Teacher Education Programs (TEPs) face the issue of how to support preservice teachers in developing teaching skills that link theory and practice. The core practices approach offers a relevant alternative, including the definition of focal teaching practices and pedagogies of practice to promote them. One such pedagogy consists of approximations, through which preservice teachers can try out practices in low-stakes settings. These pedagogies are usually time intensive and can require substantive course restructuring. This raises the question of whether teaching simulations can be productively used in less intensive settings, and how these are perceived by students. We present the results of a quasi-experimental study conducted with preservice secondary teachers in Germany. The study assesses a novel teaching simulation and compares it with an established video-based analysis learning setting. Both conditions were implemented as part of a university-based seminar accompanying a five-month field experience focused on fostering productive classroom dialogue. The research aim was to assess the new simulation where a preservice teacher was meant to practice conducting productive classroom dialogue, which was videoed and then analyzed collectively (n=180 students). We compared this setting with a video-based analysis of classroom dialogue (n=100 students). The research questions focus on students' learning perceptions and self-efficacy perceptions around dialogic teaching, which we addressed using pre-post surveys. Our main results show that preservice teachers in the simulation condition had significantly more positive perceptions of the learning setting, including reported knowledge gains and intention to apply. Meanwhile, both groups had equally high levels of self-efficacy regarding classroom dialogue from pre to post-test with no significant interaction effect in favor of the IG. We discuss the results, which offer support for the proposed intervention, considering previous research on learning to teach in a teaching practicum. The lack of changes in self-efficacy is addressed, considering limitations and aspects for further research.

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[1] Artículo original en inglés

INTRODUCTION

The relation between theory and practice in teacher education poses long-standing challenges in the design of Teacher Education Programs (TEPs) worldwide. A central question is: how to prepare teachers for creating inclusive and challenging learning environments amidst the inherent uncertainty of classroom interactions? (Forzani, 2014). The practice-based teacher education movement and the U.S.-based Core Practice Consortium, in particular, have developed both conceptual and practical tools in answer to this question (Core Practice Consortium, n.d.; Grossman et al., 2009). They posit that preparing practitioners for their work requires identifying practices that preservice teachers (PSTs) can begin to learn —usually called core practices or high leverage practices— and developing pedagogies that support them in learning these during their studies (Forzani, 2014). This approach is grounded in a sociocultural understanding of teaching and learning which emphasizes its interactive and situated character (Grossman et al., 2009). Core practices are thus described as routines requiring skill, knowledge and situated professional judgment to respond to uncertainty in daily classrooms.

A growing body of empirical studies has explored innovations that build core practices into TEPs, embedding them within teachers' field experiences or university courses. This frequently results in substantial modifications to these programs (Matsumoto-Royo & Ramírez-Montoya, 2021). However, there is significant variation within and across countries in how TEPs are structured, affecting the implementation of such innovations. The challenges of integrating core practices in preservice teacher education can be highly context-dependent, raising questions about the suitability and scalability of these practices across different educational settings. It is crucial, therefore, to conduct studies that evaluate the effectiveness of these practices in specific contexts. Such research could provide valuable insights into how local adaptations influence the success of educational changes (Grossman & Fraefel, 2024). By examining contextualized variations, teacher educators (TEs) can get a nuanced understanding of which aspects of core practices are wide-ranging and which are contingent on local cultures and structures.

This article presents the implementation of core practices in a TEP for secondary teachers at a German university and offers insights into the work with PSTs during a five-month field experience to relate theory and practice. In the context of an accompanying course, differences between a new dialogue-focused teaching simulation followed by video analysis and the usual practice of analyzing classroom videos of teachers unknown to students were explored. Through a quasi-experimental pre-post-intervention study, PSTs' perceptions of learning and self-efficacy during the teaching practicum were investigated.

STUDY BACKGROUND

Theory-practice relationship in teacher education in Germany

Teacher education and development in Germany are organized in three phases (Cortina & Thames, 2013). The first phase entails the completion of a university-based degree, with a typical duration of four years. In the second phase, called preparatory service (12-18 months, depending on the federal state), PSTs combine school teaching with subject- and practice-oriented seminars. The third phase consists of teachers' voluntary in-service professional development throughout their careers. Primary school teachers are generalists, whereas secondary teachers —the target group of our study— usually specialize in two subjects. During the first phase, secondary teachers study the two subjects they will teach, including courses on subject matter and subject didactics. Additionally, they undertake education courses, including school pedagogy and educational psychology (Cortina & Thames, 2013.). Individual TEPs differ in the contents and the pedagogical courses offered across the 16 federal states, especially in the practicum context (Gröschner & de Zordo, 2023).

The question of what constitutes good teacher education has been discussed in Germany since the beginning of university-based teacher education in the 19th century. Since the Bologna reform in 1999, the issue of the theory-practice relationship has grown in importance (Gröschner & de Zordo, 2023). Practicum phases in the form of prolonged internships (usually five months long) are increasingly becoming the focus of curricular approaches and empirical research (Ulrich & Gröschner, 2020). The aim is to build bridges between theory and practice, and with the subjects (Lawson et al., 2015).

Despite the emphasis on the theory-practice relationship in German scholarship, especially around PSTs' field experiences, research explicitly addressing core practices is rather new. A few recent examples attempt such innovations, accompanied with evaluation research. Topics include offering a common language between schools and universities during PSTs' practicum (Schellenbach-Zell & Hartmann, 2022), and specific core practices, such as providing explanations (Asen-Molz et al., 2022), fostering text comprehension through reciprocal teaching (Kleinknecht et al., 2022), or providing feedback during student work phases (Prilop et al., 2024). Attesting to the growing interest in the topic in German-speaking countries, a new Network for Practice-based Teacher Education was recently created (2024).

In the present study, we investigate the role of a university-based simulation component as an element of PSTs' practical experiences during their teaching practicum. Thus, we contribute to a new field of research on how to link academic knowledge and practical experiences —specifically on the role of classroom dialogue— in a university-based seminar accompanying PSTs field experience (Gröschner et al., 2024).

Theoretical background

Core practices and the role of classroom dialogue in learning

Core practices are identifiable aspects of everyday teaching that can be analytically decomposed, so that novices can learn them as part of their TEPs while retaining their complexity and potential for learning.

They are high-quality and equity-oriented practices that are evidence based (Core Practice Consortium, n.d.). As their enactment is embedded in social settings, it cannot be scripted or standardized, and thus requires a high level of skill and professional judgment (Grossman et al., 2009). Sets of general and subject-specific practices have been devised and tested, including aspects of classroom life and beyond. Examples of general core practices are "designing single lessons and sequences of lessons" and "implementing norms and routines for classroom discourse and work" (TeachingWorks, n.d.).

Since Teacher Education Programs (TEPs) are time-constrained, in our courses we focus on specific core practices based on our own previous research. In this work, we have investigated the role of dialogic teaching for student learning and motivation (Gröschner et al., 2018; Kiemer et al., 2015). In recent publications, we link the literature on dialogic teaching —typically focused on in-service teachers— with core practices to enrich our courses (Gröscnher et al., 2022, 2024). Dialogic teaching can be defined as a pedagogy that mobilizes the power of talk to move thinking forward. Indeed, evidence has accumulated around the potential of high-quality classroom dialogue to promote subject learning (Alexander, 2018; Howe et al., 2019), self-efficacy, and motivation (Gröschner et al., 2018; Kiemer et al., 2015). In this sense, we employ classroom dialogue to mean a high-quality, purposeful interaction through which understanding is developed.

In dialogic teaching, teachers and students engage in cumulative, collective, and supportive interactions as they develop a repertoire of discursive moves (turns of speech with discursive functions), formats, and genre (Alexander, 2018). This is embedded in a classroom culture of equity and respect (Kim & Wilkinson, 2019). The approach calls on teachers to practice dialogue and discussion as productive forms of talk while also employing other methods (Alexander, 2018). The forms, functions and importance of students' contributions are likewise theorized as key to dialogic teaching (Mercer, 2019).

Discursive practices also have a central place in the core practices approach, not least given its sociocultural grounding (Grossman et al., 2009). Indeed, a recent review of 49 studies focused on innovations using core practices in TEPs showed that the most frequently chosen practices rely on verbal interactions: leading group discussions and eliciting and interpreting individual students' thinking (Matsumoto-Royo & Ramírez-Montoya, 2021).

In our view, the dialogic teaching literature can enhance that of core practices by focusing more on students' roles and contributions in discussions, which could improve PSTs' understanding and sensitivity toward discourse (Gröschner et al., 2024). Likewise, Michaels and O'Connor (2017) claim that all high leverage (science) practices rely on productive classroom discussions being held. Their Accountable Talk approach puts forward concrete talk moves to orchestrate dialogue and manage its complexity. They posit four talk goals, aiming for students to: express their ideas, listen to others, deepen their reasoning, and think with others (Michaels & O'Connor, 2017). These tools mainly make teachers' actions visible to PSTs, but we argue that they can also support them in listening to students' contributions. The challenge of making complex practices salient and understandable for PSTs leads us to the question of just how dialogic core practices can be learned during TEPs.

Pedagogies of core practices

The core practices approach emphasizes that PSTs learn how to teach. From a perspective of a professionalization, this does not mean reproducing techniques or scripts observed from more experienced teachers. Rather, it involves engaging PSTs in key elements of teaching including "technique, analysis, interpretation, and judgment" (Forzani, 2014, p. 365), in the recognition that every set of classroom interactions is different from the previous one. The pedagogies of core practices comprise three main linked components: representations, decomposition, and approximations of practice (Grossman et al., 2009).

Representations refer to ways in which a core practice can be portrayed providing different perspectives on it and highlighting its key aspects through the use of artifacts (e.g., lesson plans, transcripts or videos) or expert modeling (Danielson et al., 2018). Decompositions involve analytically identifying component parts of a practice to make it accessible to PSTs. Approximations of practice "are designed to provide teaching candidates with opportunities to try out different instructional moves in a low-stakes environment" (Kelley-Petersen et al., 2018, p. 94). This is accompanied by collective sensemaking and feedback, deepening the understanding of the core practice at hand.

Since the seminal publication on the pedagogies of practice (Grossman et al., 2009), a wealth of research has been published in which some or all of these components are realized and often integrated in cycles (Kazemi et al., 2016). Indeed, learning cycles are a distinctive feature of this approach, distinguishing it from other TEPs pedagogies where novices work with materials of practice —such as student written work— but without progressively approaching enactment (Forzani, 2014; Ghousseini & Herbst, 2016).

Some of the issues emerging from this research relate to the need for a more nuanced and shared language to communicate regarding core practices. Grosser-Clarkson and Neel (2020) reviewed 40 articles and found that, although researchers used the same pedagogies of practice terminology, their concrete handling differed substantially. They distinguished between two approaches. In the predesigned approach, selected core practices are embedded in a predefined instructional activity that PSTs later implement in their practicum. In the open-design approach, core practices as such are targeted and PSTs decide upon the specific instructional activities. While both paths have their own advantages, they are distinct and suit different situations. Another issue is raised by Matsumoto-Royo and Ramírez-Montoya (2021), who state that "(...) the opinion of PSTs participating in practice-based teacher education should be analyzed to discover what they feel they need to learn currently but are not" (p. 12). In contrast, other publications in the field focus rather on TEs' rationale and experiences (e.g. Kazemi et al., 2016).

Considering approximations of practice —the topic of our study—, they vary in their authenticity and closeness to future teaching tasks from university-based simulations and micro-teaching approaches, where peers act as pupils, to school-based (team) teaching (Kelley-Petersen et al., 2018; Schutz et al., 2018). Other relevant design features involve how and when these

enactments are reflected upon and the way in which feedback is provided. Existing modalities include rehearsals with in-the-moment coaching, simulations employing subsequent feedback and delayed video-based reflections.

Some recent studies conducted in the U.S. focus on the link between university-based rehearsals including in-the-moment feedback and enactment in placement schools. Kloser et al. (2019) describe how the core practice "facilitating sensemaking discussions" is addressed in two science methods courses and map it onto how eight PSTs rehearse and then enact this practice at school. Rehearsals are found to be valuable in supporting modeled practices later being implemented at school, especially practices that are made explicit and named. Similar conclusions are reached by Masters (2020), who compares eight PSTs from a seminar where generating scientific explanations was discussed and rehearsed, with another eight novices who did not engage in rehearsals. The author examined videos of PSTs enactments and reflective reports, obtaining descriptive results. She found that, comparatively, more PSTs in the rehearsal group engaged in the targeted practices at a good level; however, they still experienced difficulties in contrasting different opinions and there were substantive variations between participants. These studies offer thus initial positive indication that rehearsals could favor enactment in practice, however with small samples and qualitative analyses which preclude more substantive claims.

Other work has been carried out on the issue of PSTs' perspectives on approximations of practice (Matsumoto-Royo & Ramírez-Montoya, 2021). For instance, Ghousseini and Herbst (2016) examine the learning experiences of PSTs in a course with 23 participants, drawing from videos of two three-hour sessions (part of a longer methods course), interviews and portfolios. They inquire into the role and perceptions of the different components of pedagogies including approximations to leading a mathematical discussion. In the approximations, PSTs had to first complete the teacher moves in a fictional written dialogue and then take part in a fishbowl simulation of the sequence with subsequent debriefing. They conclude that these approximations provided PSTs with shared experiences to discuss as well as gaining insight into the complexity of the core practice and the tensions that may emerge in its enactment. Troyan and Peercy (2016) looked into how two PSTs learn in a university-based rehearsal in second language education TEPs in the U.S. They highlight the knowledge externalization process that occurred through TEs' and peers' dialogic mediation through in-the-moment coaching. A mixed-methods study conducted by Rawlins et al. (2020) in New Zealand delved into PSTs' perceptions of a university-based cycle of enactment and inquiry. They employed rehearsals with a predesigned approach in mathematics teaching, including in-the-moment coaching. Seven PSTs who acted as teachers were interviewed and indicated having gained confidence with the practice, developing an inquiry stance and acknowledging the complexity of the tasks at hand. This study also includes a three-item survey filled by 136 PSTs reporting positive views of the core practices cycle components.

In sum, a few studies focusing on PSTs' experiences and learning showcase the variety of approaches TEs take to include approximations of practice in their courses. The findings point to promising results regarding not only enactment of practices, but also their confidence to engage in the targeted core practice while acknowledging its challenges, which can be seen as a sign of professional judgment. Thus far, studies mainly center around PSTs who enact the teacher role; more research is needed that collects data from larger groups of PSTs and from novices in all roles involved. Furthermore, research lacks evidence on PSTs' perceptions of the core practice as such and their intention to implement it after taking part in simulations.

Research focus and questions

Taking a turn towards including pedagogies of practice in TEPs oftentimes requires substantive adjustments of university courses, for instance, in choosing and including focal core practices, and reconsidering the role of field experiences and TEs (Kazemi et al., 2016; Neel, 2018). The examples available in the literature often come from single-subject methods courses. These usually involve relatively small groups of PSTs and have a large amount of facetime, with weekly classes and school visits (Kelley-Petersen et al., 2018; Kavanagh et al., 2019). Such a learning setting affords the creation of a sense of community and shared norms that can help PSTs to deprivatize practice (Troyan & Peercy, 2016). Notwithstanding, these conditions can be seen as having a high threshold, requiring sometimes sweeping changes in course design, giving rise to multiple decisions and tensions (Neel, 2018).

Our own setting differs from the described conditions insofar as our seminars are not as resource- and time-intensive as other TEPs, only offering three seminar meetings over the accompanying course of a five-month teaching practicum and without the possibility of keeping the groups constant. Furthermore, the seminars focus on general aspects of teaching and learning rather than a single subject matter and are attended by PSTs from multiple subjects on the secondary level. Having outlined these differences, we deemed it relevant to explore whether approximations of practice could be productively conducted in such a setting and how this compares with our usual practices in an online seminar using external videos to relate PSTs' field experience. As a first step, we were interested in the implementation and PSTs' perceptions on the new simulation format in the course.

One key decision we made was to implement simulations where feedback would be provided after the teaching sequence (as a group-based debrief). This obeyed to two main reasons: first, we saw rehearsals (which include in-the-moment coaching) as requiring more of a set of group norms than our setting allowed given that the exact same group did not coincide more than once; and second, we aimed to keep the flow of the teaching sequence intact to enhance authenticity, feedback quality and the power to reflect upon teaching for all involved. Previous research on video-based feedback shows that immediate reflection supports authenticity, the experience of relevance, and motivation of (beginning) teachers (Gröschner et al., 2015; Jähne et al., 2022). To be able to offer brief remarks regarding classroom dialogue to the enacting teacher in a less intrusive form, we employed the in-ear communication technology available in our Learning to Teach Lab: Science (see study context).

Given that approximations are a relatively novel learning setting in TEPs and are comparatively deman-

ding for novices and lecturers alike, it is important to consider how they are perceived by PSTs, in contrast with other more established practices that can also be employed, like the analysis of classroom videos (Gaudin & Chaliès, 2015). Such videos have been shown to lead to high emotional and motivational engagement, as well as more engaged discussions when compared to viewing one's own or peers' videos (ibid.) We are not aware of studies to date that compare the benefits of observing videos to decompose core practices with participating in teaching simulations followed by a video reflection.

Our study is anchored in the area of PSTs' field experiences. Recent research on the role of field experiences in teacher education investigates their effectiveness by assessing PSTs' perceptions of the teaching practicum (Ulrich & Gröschner, 2020). For example, the role of different reflection tools, especially lesson videos, on PSTs' learning is assessed (Gaudin & Chaliès, 2015; Kleinknecht & Gröschner, 2016). Other studies measure the effect of a teaching practicum on PSTs' intention to behave in school, operationalized as motivation and interest (Dehne & Gröschner, 2023) or self-efficacy (Klassen & Durksen, 2014). In particular, self-efficacy is an important individual teacher belief, preparing PSTs to do the necessary activities to become a professional teacher (Täschner et al., 2024). It also predicts central aspects of effective teaching: classroom climate, constructive support, classroom management and cognitive activation (Praetorius et al., 2018).

We anticipate that one possible mechanism through which university-based teaching simulations could be beneficial for novices is that of contributing to their sense of self-efficacy with regard to the targeted core practice. This would be thanks to their increased proximity to a classroom situation when compared to representations like transcripts or videos. Indeed, the practicum, in general, has been deemed as a relevant context of TEPs through which self-efficacy beliefs can develop (Gröschner et al., 2013). During a teaching practicum, PSTs face situations that are close to their future professional responsibilities and which require them to trial their knowledge and skills (Bach, 2022; Klassen & Durksen, 2014). In turn, if PSTs feel more confident about their ability to implement certain core practices after taking part in approximations of practice, this could lead to their increased usage during the practicum and beyond (Täschner et al., 2024). Some small-scale qualitative findings hint in this direction (e.g. Troyan & Peercy, 2016) however, up until now, this has not been studied in larger groups.

Thus, our research focus is on how PSTs perceive and benefit from a teaching simulation setting during their practicum (Intervention Group, IG). We compare this to a more common approach where PSTs become familiarized with classroom dialogue using lesson transcripts and videos as representation and decomposition of practice (Control Group, CG), analyzed in their usual online teaching setting.

The following research questions are addressed:

1. What are PSTs' learning perceptions after taking part in a lesson simulation session in comparison with an online video analysis session (IG vs. CG post-test)?

1. Does PSTs' self-efficacy to enact dialogic classroom practices change during a teaching practicum depending on whether they participated in a teaching simulation (IG) or in an online video-analysis learning setting (CG, pre- to post-test)?

METHODS

Study context

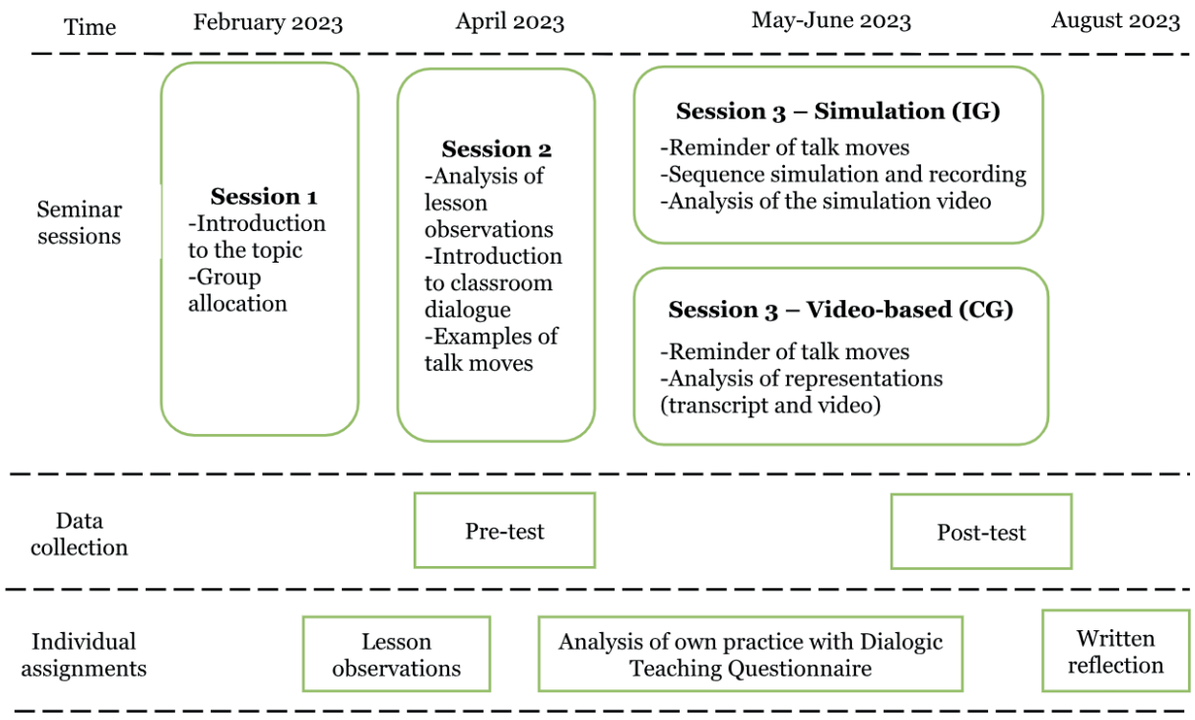
Our TEP includes a five-month practical semester, which PSTs complete during their third study year. This is described as a university-accompanied practical semester. In it, in addition to their time at school, novices attend university seminars once a week, alternating courses between the didactics of their two subjects and educational science. Teacher candidates are distributed in a large number of placement schools across the federal state of Thuringia and beyond, where they are supported by locally appointed mentor teachers. University lecturers do not get to visit them at school.

In our accompanying course on school pedagogy, we integrate PSTs' school experience through individual assignments and the use of materials of practice (see figure 1). Still, as we cannot assure that PSTs have a chance to observe valuable aspects of classroom dialogue in their placement schools, we developed and tested a simulation component to facilitate first-hand experience at the university. The study is embedded in the Learning to Teach Lab: Science (LTL:S), a learning and research setting which includes a classroom laboratory (Gröschner et al., 2022). The room is designed to enable the video recording of whole-class and small-group interactions. Live observation can be carried out through a mirror room from where the video recordings are controlled and feedback can be provided to the teacher using an in-ear system.

Study design

We assessed our simulation setting using a quasi-experimental, pre-post design. The study was implemented in the summer semester of 2023 (March to July), when N=280 PSTs were completing their practicum. We incorporated the simulation component in our teaching gradually, offering the new version to some PSTs (= IG), while keeping our existing teaching design of the online accompanying seminar for others who served as our control group (= CG) (figure 1). In the existing approach, one seminar session drew on the decomposition of practice using transcripts and video materials from teachers unknown to participants. For the IG, we conducted one in-person session in our LTL:S. Despite these changes, the new simulation format (IG) did not differ from the control group (CG) in terms of session duration and topic.

Figure 1
Seminar design and intervention

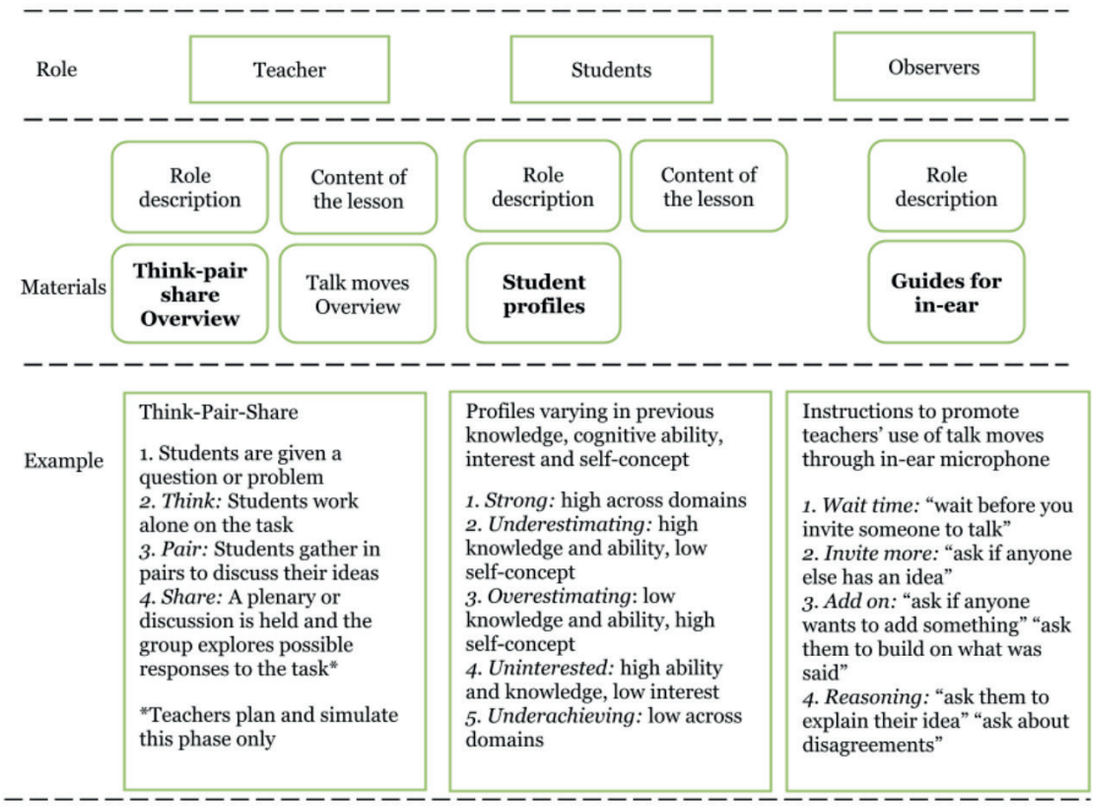


The seminar comprises three live sessions and a set of individual assignments (see figure 1). The first two sessions were kept equal for all PSTs. In session 1, all N=280 novices took part in an introductory event before the start of the practicum. In addition to organizational aspects, we presented the theoretical foundations and current research on dialogic teaching. PSTs then started their practicum at school, where they devoted their first few weeks to observing lessons. We then gave them the first individual assignment: structured observation tasks to record the participation behavior of the learners and the way that teachers called on students and posed questions. Session 2 was conducted online four weeks later in groups of up to 47 participants and one TE. PSTs were asked to discuss their observation assignments and potential strategies to address identified shortcomings in dialogue. We then linked these findings with evidence of classroom dialogue considering communication patterns, talk formats and dialogic talk moves (Michaels & O'Connor, 2017). After this session, the pre-test was applied to assess PSTs' self-efficacy regarding classroom dialogue (see section Instruments and data analysis). The next individual assignment was applying the self-audit tool Dialogic Teaching Questionnaire (Gröschner et al., 2021) thrice during the semester and writing a final reflective report on their dialogic practices.

PSTs continued with their school practicum, and after 4-8 weeks they attended session 3, with groups of up to 18 PSTs in the IG and up to 25 in the CG. In both cases, our goal was to analyze and decompose dialogic practices focusing on selected talk moves. What differed were the representations: In the CG, dialogue was illustrated using a lesson transcript (a history lesson) and two lesson video clips (mathematics and physics) from three teachers unknown to PSTs. We introduced three steps for observing videos, namely describing, explaining, and formulating alternatives (Seidel & Stürmer, 2015). PSTs had to analyze each video sequence to identify talk moves, first in small groups and then in the whole group. After the session, PSTs filled in the post-test.

In the IG, we implemented the teaching simulation setting in the LTL:S facilities. Our approach is predesigned following Grosser-Clarkson and Neel (2020), given that we selected an instructional activity (Think-Pair-Share), topic, and core practice in advance. For the simulation, participants were assigned to three groups: 'teachers', 'students' and 'observers' (figure 2). The volunteer 'teachers' were tasked with orchestrating a discussion using dialogic talk moves, with 20 minutes to prepare. Their supporting materials included lesson contents (e.g. "should smartphones be allowed as working devices during lessons at school?"), a description of the Think-Pair-Share method and a set of talk moves. 'Observers' also had materials with the lesson contents and details of the targeted talk moves. During the planning time, 'students' read through the lesson contents, and we randomly assigned them profiles to help them enact their roles. These evidence-based profiles (Jurik et al., 2013) were meant to give the simulation an adequate level of complexity and richness, which can otherwise be hard to achieve with unprompted participants (Neel, 2018).

Figure 2
Simulation roles and materials



The sequence was staged for approximately 15 minutes and recorded using the built-in LTL:S cameras. The lecturers and observers stood in the mirror room, from where observers could analyze the sequence and, if necessary, employ an in-ear microphone to give the teacher brief instructions to improve classroom communication (figure 2). Drawing on their criterion-based observation, their perspectives were pivotal in the video-supported debrief with the whole group after a simulation. Other than these instructions, we let the sequences unfold without interruption. At the end of the simulation, after a short debrief about how roles were experienced, we showed the video captured with the overview camera, stopping and discussing it (app. 60 min). We examined whether and how talk moves had been implemented, with "observers" and TEs guiding the discussion and bringing dialogue and specific talk moves to the fore, while also allowing for peer feedback. Directly after session 3, PSTs completed the post-test.

Participants

In total, N=280 PSTs attended the seminar and n=266 filled out at least one questionnaire. For the intervention session (session 3), PSTs had to sign up for a date and either in person format (IG) or online format (CG) without receiving any additional details about the seminar activities. In the IG, we split the n=180 students into ten time slots with n=18 students each. This group size was appropriate for the Lab capacity, as well as providing a simulated class size of 14 students, which we deemed appropriate. In turn, n=100 students attended an online session, for which four slots were available (n=25 in each). This group size was deemed appropriate for the online session, allowing us to create group discussions and small-group discussions. While group sizes differ slightly across the IG and CG, we see both cases as examples of mid-sized higher education seminars, thus considering them comparable. In total, eight TEs (including the three authors) taught the course, with IG sessions being conducted in tandem.

After sessions 2 and 3, PSTs were asked to complete an online survey. Participation was voluntary and data were collected in anonymized form. Participants signed an informed consent form for the first survey, detailing the study goals and participation conditions. The first research question referring to the perception of the seminar only required data from the final post-test, for which a sample of n=159 was available. Our analyses focusing on changes in self-efficacy required pre-post datasets, for which n=109 cases were available.

Instruments and data analysis

Pre and post-test data were collected in an online survey platform. To address the first research question on PSTs' perceptions of the seminar and their learning, we drew on items employed in our university teaching evaluation surveys and constructed items asking novices to evaluate the seminar and their learning perceptions after session 3. Following an exploratory factor analysis (EFA), the items loaded in three scales plus one additional item (table 1).

Table 1
Seminar evaluation scales

Subscale	N° items	Scale	α	Sample item
Gains in knowledge	*5*	*1 (fully disagree) - 6 (fully agree)*	*.94*	*The seminar has furthered my knowledge of classroom dialogue*
Knowledge application	*3*	*1 (fully disagree) - 6 (fully agree)*	*.88*	*After the seminar, I will be able to use my knowledge of classroom dialogue in my teaching*
Theory-practice link	*5*	*1 (fully disagree) - 6 (fully agree)*	*.92*	*By taking part in the seminar, I will improve my dialogue practice in the classroom*

To answer the second research question, we constructed items reflecting talk moves and other elements of the core practice we sought to promote (Michaels & O'Connor, 2017). The initial instrument contained 16 items rated on a 6-point scale, from "I fully disagree" to "I fully agree". After examining the instruments' structure through an EFA, three subscales with appropriate internal consistency were included in the following calculations. One scale had four items (Wait time, e.g. "I am convinced that I will succeed in providing sufficient waiting time" = .85) and two had three items (Invite all, e.g. "I am convinced that I will succeed in involving all students in a productive discussion" = .83; Reasoning, e.g. "I am convinced that I will succeed in having students explain their answers" = .85). We used independent t-tests to assess the perceptions of the seminar and performed a multivariate analysis of variance to test changes and group differences in self-efficacy. No further individual characteristics were assessed.

RESULTS

Research question 1: Learning perceptions

Our first research question was whether PSTs' perceptions of the learning setting and their own learning gains varied across the two groups. The descriptive results show that the means for both groups are around a score of four from a maximum of six, which can be seen as medium. This indicates that, although there was a good degree of satisfaction with the learning setting (simulation vs. video), in neither case did this approach the maximum possible. Notwithstanding, as indicated in table 2, the t-tests show that the IG had significantly higher mean scores for all scales: gains in knowledge (95%-CI[0.09, 0.77]), knowledge application (95%-CI[0.15, 0.84]) and theory-practice link (95%-CI[0.38, 1.03]). The overall relevance of the seminar is also rated higher in the IG (95%-CI[0.27, 1.14]). In sum, PSTs in the IG had a more positive perception of their learning and the possibility to transfer it to real-life teaching.

Table 2
Comparison of the learning perceptions across two groups

Evaluation	(IG)		(CG)		
	n	M (SD)	n	M (SD)	t-Test
Gains in knowledge	*101*	*4.54 (.99)*	*101*	*4.11 (1.07)*	*t(111.05) = 2.497, p =.014*
Knowledge application	*101*	*4.56 (.95)*	*101*	*4.06 (1.09)*	*t(106.11) = 2.870, p =.005*
Theory-practice link	*101*	*4.63 (.91)*	*101*	*3.93 (1.04)*	*t(105.94) = 4.290, p =.000*
Relevance	*101*	*4.72 (1.18)*	*101*	*4.02 (1.40)*	*t(103.18) = 3.246, p = .002*

Research question 2: Self-efficacy related to classroom dialogue

Our second research question focused on self-efficacy to engage in classroom dialogue. The descriptive results in table 3 indicate that both groups already had a medium sense of being able to implement dialogic practices in the pre-test, with mean values around a score of four. Pre-post comparisons indicate there is no significant change over time and no interaction effect (table 3). This means that we did not find statistically significant interactions between time and group regarding all tested dimensions of self-efficacy on classroom dialogue (Wait time: $F(1, 107) = .379$, $p = .539$, $\eta^2 = .004$,95%-CI[-.176,147]; Invite all: $F(1, 106) = 1.44$, $p = .233$, $\eta^2 = .013$, 95%-CI[-.1012174]; Reasoning: $F(1, 107) = .005$, $p = .946$, $\eta^2 = .000$, 95%-CI[-.166,199]).

Table 3
Group comparisons regarding self-efficacy in managing classroom dialogue

Self-efficacy		Pre		Post			
		n	M (SD)	n	M (SD)	ANOVA	η^2
Waiting time	*Simulation*	*65*	*4.50 (.83)*	*65*	*4.47 (.82)*	*F(1, 107) =.379, p=.539*	*.004*
	Video analysis	*44*	*4.46 (.89)*	*44*	*4.52(.83)*		
Invite more	*Simulation*	*65*	*3.99 (.91)*	*65*	*3.79 (.99)*	*F(1, 106)= 1.44, p=.233*	*.013*
	Video analysis	*43*	*4.03 (.97)*	*43*	*4.06 (.78)*		
Reasoning	*Simulation*	*65*	*4.45 (.76)*	*65*	*4.44 (.94)*	*F(1, 107)=.005, p=.946*	*.000*
	Video analysis	*44*	*4.24 (.88)*	*44*	*4.23 (.82)*		

At the same time, there is no difference between the groups in this respect either before or after the intervention. The Wait time scores are slightly higher in the IG (M=4.50, SD =.83) than in the CG (M=4.46, SD=.89) in the pre-test, but this is statistically non-significant (t(87.99)=.281, p=.779). The same is also evident for the self-efficacy scale on promoting Reasoning. Here, the IG value (M=4.45, SD=.76) is slightly, but not significantly, higher than that of the CG (M=4.24, SD=.88; t(82.64)=1.253, p=.214). In contrast, at the beginning of the teaching practicum, the participants in the CG (M=4.03, SD=.97) rated their self-efficacy regarding Supporting the active participation of all learners slightly, albeit not significantly higher t(85.82=(-).25, p=.214), p=.831) than the IG (M=3.99, SD=.91).

DISCUSSION, LIMITATIONS AND FUTURE RESEARCH

The present study aimed to investigate the effect of a new simulation component as part of an accompanying seminar that PSTs attend during their five-month teaching practicum by comparing it with an existing video-based, online reflection approach using a quasi-experimental pre-post-test design. We found that, compared to the CG, PSTs in a live teaching simulation group (IG) were comparatively more satisfied with their learning setting in the course. They scored significantly higher in their assessment of their own learning gains, the applicability of the contents, the strength of the theory-practice link, and the overall relevance of the seminar. This speaks in favor of the simulation setting regarding students' perceived learning, which aligns with previous qualitative findings regarding the teaching simulation (Gröschner et al., 2024). Furthermore, previous research found that university-based courses that address PSTs' practical pedagogical experiences predict their positive knowledge and learning perceptions after the practicum (Gröschner et al., 2013; Mertens & Gräsel, 2018).

Our findings are in line with Rawlins et al. (2020), who found that PSTs also had a positive perception of the planning, implementation and reflection components of rehearsals. However, these findings extend previous research in at least two ways. First, by comparing the simulation setting with an online video-based setting (a usual way of teaching known to the students), we see that PSTs tend to have a positive perception of approximations and their decomposition, which is better than their peers' who underwent a decomposition based on other materials of practice. These results therefore underscore the relevance of surveying PSTs' perceptions of practice-based learning settings in teacher education (Matsumoto-Royo & Ramírez-Montoya, 2021). Second, our IG participants not only assessed the seminar as relevant but also reported comparatively higher learning scores and a promising intention to apply and transfer their knowledge into practice.

This finding adds new insights into the role of simulations compared to using (only) external videos (Gaudin & Chaliés, 2015). It speaks for a differential positive effect of a simulation component perceived by PSTs as a possible bridge between what students do at university-based seminars and its connection to placement schools (Zeichner, 2010). Furthermore, the positive results illustrate how learning opportunities at university addressing relevant core practices (such as classroom dialogue) can contribute to teacher professionalization and add to what is usually expected from school-based mentoring and mentor teachers' support (Kuhn et al., 2022).

Our second research question focused on whether self-efficacy beliefs related to implementing specific classroom dialogue moves in PSTs' practice changed after the intervention and if these changes favored the simulation-based group. In this regard, self-efficacy beliefs were equivalent for both groups and stable over time. The scores (around a value of four out of six) point to a mid-high level of efficacy with regards to classroom dialogue both after session 2 of the seminar, and after session 3 (1-2 months apart).

In line with other studies in which effects on PSTs' self-efficacy during a teaching practicum were assessed, we see that changes in self-efficacy beliefs relate to the teaching practice, independent from what has been

addressed in accompanying university courses. To be clear, taking part in simulations is as good as using video analysis and transcripts in influencing self-efficacy on dialogic classroom practices. A possible explanation is that the intervention, consisting of one 3-hour session, was not lengthy enough to affect PSTs' self-efficacy beliefs. In this case, we hypothesize that repeated experiences with simulations would be necessary to affect change beyond PSTs' positive perceptions of the learning setting. Another interpretation is that PSTs already reported quite high mean values in the pre-test so a positive change could have been sensitive to the ceiling effect (Gröschner et al., 2015). Regarding scaling up teacher education research (with large groups) in the field of classroom dialogue (Howe et al., 2019), there is a need to test less resource-intensive approaches considering what is workable in academic settings, compared to other contexts where more intensive, even weekly work is carried out (e.g. Troyan & Peercy, 2016).

More trials may be necessary to balance learning opportunities and available resources in our own learning setting and in other TEPs where educators' settings are similar. Our results, considering PSTs' positive experience, show that starting small can be productive and perhaps help avoiding some of the tensions of full-blown course redesign (Neel, 2018) by building up TEs' expertise and simulation units that can be refined with time. In our case, a whole-class simulation with around 14 'students' followed by video reflection gave one student per group the opportunity to enact the teacher role. It would be productive to research each rope, to see whether students in non-teaching roles benefit from simulations, and whether the learning differs from those acting as the teacher. We consider this in a current study. If enacting the teacher role does prove critical for learning or self-efficacy development, an alternative would be to create simulations in smaller groups where the teacher part can rotate (e.g. Peercy & Troyan, 2020). Another important future research avenue would be to see if in-the-moment coaching proves feasible in lower-threshold settings like ours, and whether students perceive and benefit differently from such an approach compared to subsequent video-based feedback like the one we employed here.

The present study provides new insights into the potential and possible shortcomings of incorporating simulations in (short) interventions. It is important, however, to acknowledge its limitations. In our quasi-experimental intervention-control group design participants showed similar starting conditions in both groups; however, controlling for variables like motivation or format preference (in person vs. online) and conducting randomization is still advisable in further research. Furthermore, we did not account for factors that could influence PSTs' self-efficacy beliefs (Klassen & Durksen, 2014), such as students' grade point average, the discourse culture they experienced at school and the feedback from their mentor teachers (Kuhn et al., 2024). As in other studies, the initial number of participants was relatively large, but only around 40% of students provided data at both measurement points, which may be due to PSTs not being actively involved or present at the very end of the online sessions when they were asked to fill-in the questionnaire.
Finally, our IG and CG differed not only in their methods but also in their modality, with the IG taking place in person and the CG being implemented in a synchronous online format. While this variation is potentially relevant, we do not think our results can be explained away based on modality alone. Online teaching remained the norm at our university until 2021, and many courses continue to employ hybrid formats up to the present.

Thus, all students would have experienced online and in-person sessions, reducing potential issues such as novelty or lack of knowledge on how to participate. Furthermore, students chose the modality themselves, thus reducing the possible effect of a disfavored modality affecting self-report. However, it would be advisable to rule out the effect of modality by comparing the use of videos and simulations in in-person groups only.

As a result of these first experiences with simulations, our results considering PSTs' positive perceptions and our own learning experience have encouraged us to continue working with the approach. We have further tailored our intervention to provide stronger prompts for dialogue and we have collected data on participants' roles too, so that potential differences can be examined. This and other research should work to expand our understanding of the inclusion of approximations of practice in TEPs, their learning potential and their contribution in promoting classroom dialogue from an early stage in teachers' careers.

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Conflicts of interest
The authors declare no conflicts of interest.

Funding
This research of the Learning to Teach Lab: Science (LTL:S), at the Friedrich Schiller University Jena, is funded by the German Federal Government and the Federal States through the Federal Ministry of Education and Research as part of the joint Qualitätsoffensive Lehrerbildung [Initiative to promote teacher education] Project (Project: PROFJL2; Grant number: 01JA1808).

Acknowledgements
We would like to thank Dennis Hauk for his support in designing the intervention materials, and Florentine Hickethier for her assistance with data collection and curation. We also thank the lecturers and preservice teachers involved in the course. Finally, we are thankful for the anonymous reviewers' helpful feedback on the manuscript.

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