

The Effects of Short Online Pedagogical Courses on University Teachers' Conceptions of Learning and Engaging Students During Lectures

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Abstract

Pedagogical training is considered an efficient tool to train university teachers to understand and foster active learning. In Finland, pedagogical training courses are organized periodically at universities, and university teachers participate voluntarily to improve pedagogical knowledge and skills for teaching in higher education settings. This study aims to examine the effects of short online pedagogical training courses on the development of university teachers' conceptions of active learning from two perspectives: the role of prior knowledge and engaging their students during lectures. The effects of the training were measured through self-reported questionnaires completed by teachers at a Finnish university before and after the pedagogical course ($N = 108$). The results showed an increase in participants' perceptions of the importance of prior knowledge in the learning process, and a decrease in the idea of learning as remembering. Additionally, the awareness of developing engaging lectures increased by the end of the courses. These outcomes indicate the benefits of short pedagogical courses for pedagogical development, especially for university teachers who have not had any prior training in pedagogy.

Keywords: Short online pedagogical training, active learning, engaging lectures, prior knowledge, higher education

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Universities worldwide strive for high-quality teaching, but pedagogical training is not yet available for all university teachers. One reason for this is the high cost of such training, especially if course duration is long. The question is, therefore, whether short courses can have any effect on teachers or future teachers, specifically on the pedagogical development of doctoral students. The goal of this study is to examine solutions for improving the quality of teaching in higher education through short pedagogical training courses. It focuses on exploring the effects of a short online pedagogical training course on two central aspects of active learning in higher education: teachers' understanding of their students' learning in terms of the importance of prior knowledge in the learning process, and teachers' readiness to use teaching methods that engage students in their lessons and lectures. In this study, "lecture" refers to all teaching situations led by a teacher.

Several studies have suggested that instructors' conceptions of learning and teaching affect the way they teach (Berliner, 2001; Blömeke et al., 2015; Donche & Van Petegem, 2011; Heinonen et al., (2023); Norton et al., 2005; Postareff et al., 2007). According to Vilppu et al. (2019), teachers' view of teaching ranges from transmitting facts to supporting students' knowledge creation. These attitudes mirror the perception of teachers of how learning can occur by remembering facts or by revising prior knowledge to generate new ones. Hence, the solution to improving active learning in university classes should start with raising awareness of teachers' conceptions of how learning occurs and how to engage students during lectures (Murtonen et al., 2022; 2024; Södervik et al., 2022)

In pedagogical training, the instructional knowledge and skills of teachers can be profoundly improved by starting with their conceptions of teaching and learning rather than merely employing new teaching techniques (Murtonen et al., 2024; Teräs, 2016). Prior knowledge is one of the most crucial aspects of the active learning of students; however, this is poorly understood by teachers (Meyer, 2004). Thus, pedagogical training should support university teachers' understanding of the nature of learning and teaching—for example, their conception of the role of prior knowledge—which, in turn, affects their approaches to teaching and teaching practices (Entz, 2007; Vermunt & Endedijk, 2011). When teachers recognize the role of prior knowledge in student learning, they tend to consider employing more engaging teaching methods (Lonka & Ketonen, 2012; Murtonen et al., 2022; Södervik et al., 2022).

The role of pedagogical training and its effectiveness in higher education has received increased scholarly attention; however, most research has been conducted on relatively long training programs on pedagogy (Gibbs & Coffey, 2004; Postareff et al., 2007; Postareff & Lindblom-Ylänne, 2008; Robinson & Hope, 2013). In addition to the high costs for the faculty, the problem with these long training sessions is that teachers do not have the time and resources to participate, and not all teachers are accepted into the courses (Murtonen & Vilppu, 2020). Thus, a short online pedagogical training course could offer an alternative for faculty members. The findings from this study could provide items for consideration as well as suggestions for the development of short pedagogical training programs to make them effective, accessible, and meaningful to academic staff.

This article presents a brief review of the literature on the importance of teachers' awareness of the role of prior knowledge in the learning process and of providing engaging lectures in university classrooms. These two aspects are crucial in fostering active learning and, therefore, they are the focus of pedagogical development of university teachers. In this study, university staff participated in short online pedagogical training courses. The methodology section shows the study design used to evaluate before-and-after effects of short

pedagogical training courses on teachers' conceptions of learning and of engaging students in lectures. The results reveal the effects of the courses as well as which groups of participants, based on their teaching experience and prior pedagogical knowledge, could benefit most from the training. Following the results, we discuss our findings, consider the limitations of the study, and provide suggestions for future research on short online pedagogy courses.

Review of the Literature

Teacher pedagogical development is expected to focus on how teachers can support the active learning of students, and this primarily requires teachers to possess a comprehensive understanding of learning processes (Hodges, 2020). Therefore, teachers need to improve their conceptions of learning, with an emphasis on the role of prior knowledge in the learning process as well as knowledge about the importance of engaging lectures. These concepts are at the center of teacher pedagogical education, which can be developed through training programs for teachers and educators in higher education.

Teachers' Conceptions of Learning and the Role of Prior Knowledge in Learning

Prior knowledge plays a crucial role in the learning process (Bransford et al., 2000). This is particularly true when learners encounter new learning circumstances; when the new information does not conflict with the existing one, new knowledge may be created by adding new facts to the previous understanding structure or complementing incomplete prior knowledge (Chi, 2008, p. 61). By contrast, if new information conflicts with prior knowledge, an adjustment is required to accommodate existing knowledge with new context (Chi, 2008, p. 61). In other words, to construct new knowledge, it is crucial to activate and connect prior knowledge with the new context and to rearrange and revise incorrect prior understanding to comport with the current one.

Although prior knowledge is considered perhaps the most important factor in learning, teachers' attitudes regarding the role of prior knowledge in the learning process is not uniform (Meyer, 2004). For university teachers, this challenge of prior knowledge exists on two levels: first, that their students may have naive prior conceptions concerning the substance to be learned, and second, that teachers themselves may have misconceptions regarding learning and teaching (Murtonen et al., 2022; Södervik et al., 2022). Both levels may influence the extent to which teachers can support the active learning of their students. Naive conceptions of learning as a remembering skill may lead to teacher's focus on students' retention skill in teaching-learning situations (Ritter et al., 2013, p. 131).

According to O'Donnell and Dansereau (2000), appropriate consideration of the role of prior knowledge is essential for effectively utilizing suitable sources for teaching and designing learning activities. As Bolhuis and Voeten (2004) pointed out, teacher's shift from in a view of teaching as a transmission of facts to the facilitation of knowledge construction influences the way students are expected to learn. The shift in the teaching view can encourage learners to transition from a passive to an engaged, active learning approach. Whereas passive learners accept and remember taught facts, active learners practice independent critical thinking, reasoning, exploring, and problem-solving to acquire meaningful learning (Bolhuis & Voeten, 2004). Similarly, Lee et al. (2019) proposed that teachers may demonstrate three types of teaching (i.e., progressing, reviewing, and recalling) which are associated with their perception of the role of prior knowledge in learning. According to the authors, when teachers consider prior knowledge to be a concept to develop, they use the progressing teaching method. With this method, teachers leverage potential components of tasks to activate the prior understanding of learners and connect the prior

knowledge to new contexts to develop comprehensive knowledge. By contrast, if teachers do not find prior knowledge as a concept that can be developed, they will focus on recalling or reviewing previous information, a process that demands the retention skill of students without exploring students' understanding to develop it in the newer learning context (Lee et al., 2019).

In summary, the way teachers conceive of learning and the role of prior knowledge in learning may relate to the efforts teachers make to create suitable learning tasks in the classroom to enhance students' active learning.

Improving Active Learning Through Engaging Students

Teachers' conceptions of learning are linked to their approaches to teaching and their expectations of student learning (Bolhuis & Voeten, 2004). Given that learning is a social process and learners actively construct knowledge rather than receive facts passively (Bolhuis & Voeten, 2004; Chi & Wylie, 2014), students benefit from what they are taught when teachers encourage them to engage with lectures and learning activities. This implies a need for teachers to increase their interactions with students to strengthen the connection between learners and what they are learning.

An engaging lecture is viewed as an interactive and shared process between teachers and students (Lonka & Ketonen, 2012). Thus, teachers do not solely provide knowledge, and students are not passive receivers. In contrast to traditional didactic lectures, engaging lectures enhance deep and effective learning processes (Jones, 2007). The engaging lecture represents teachers' adoption of the learning/student-centered focused approach to teaching. The student-focused approach encourages learners to engage in constructing deeper understandings, reflections, and insights through the guidance of the teacher (Donche & Van Petegem, 2011; Vilppu et al., 2019). Thus, boosting the active participation of students in lectures may contribute to the enrichment of the content topics. In this paper, the word "lecture" means the same as a lesson—that is, it is taught by a university teacher, either online or in a classroom. Engaging lectures are interactive or effective teaching aimed at supporting students' active learning (deWinstanley & Bjork, 2002; Lenz et al., 2015; Miller et al., 2013). Engaging lessons are designed with interactive learning activities that hold the attention of participants (deWinstanley & Bjork, 2002; Kaur, 2011; Lenz et al., 2015). Engaging lessons may involve interactive elements, such as discussions or hands-on activities, and they may be delivered in a dynamic and energetic style. The goal of an engaging lesson is to keep learners interested and involved in the material being presented to maintain a learner-centered learning environment (Lenz et al., 2015). Engaging lectures can support students immensely to develop their competencies and nourish their motivation to learn (Lonka & Ketonen, 2012).

To facilitate the active learning of students through engaging lectures, teachers may need to increase their interactions with students. The effort teachers make to interact with students depends on the extent to which teachers change their priorities from transmitting content to providing students with opportunities for better learning and understanding. This effort becomes obvious when teachers consider their role as facilitators of the learning process of their students by creating meaningful learning activities, motivating students to participate, providing feedback, and helping students to reflect and think critically about the learning tasks (Fernandes et al., 2014). According to Rob and Rob (2018), teachers' facilitation of students' collaborative learning is crucial in engaging lectures to increase interactions among learners and encourage the sharing of knowledge, because these activities help to create meaningful conversations among participants.

Nevertheless, researchers have found that teachers encounter obstacles (e.g., time constraints and curriculum demands) that may interfere with the implementation of engaging lessons (Atjonen et al., 2011), or they may simply prefer to continue using traditional didactic lectures (Konopka et al., 2015). Importantly, the extent to which teachers perceive these obstacles as affecting the implementation of engaging lectures could reflect how teachers perceive the nature of teaching and learning. For example, Martin et al. (2000) found that when teachers shift their focus from delivering the target content to the learning process of students, they make more effort to engage students in lectures. This shift enhances the effort of teachers to connect students with the content of lectures and relevant meaningful practices (Postareff & Lindblom-Ylänne, 2008). Such teachers are more willing to spend extra time with their students to explain questions and scaffold students' development of comprehensive knowledge. By contrast, when teachers focus on lesson content, they may perceive this as a demand that they deliver all the content materials in a given period. Fobes and Kaufman (2008) explained that this is because such teachers find themselves in the position of intellectual authority in the classroom, which might prevent an "invitation" to students to be "co-teachers" (p. 28).

Pedagogical Development of University Teachers by Pedagogical Training Programs

In the past two decades, pedagogical education has drawn attention to its essential value for improving the professional development of instructors regarding teaching in universities (Murtonen et al., 2019; 2022; Södervik et al., 2022; Entz, 2007; Rienties et al., 2013; Rivetta et al., 2018). Professional development for novice and senior teachers occurs through accumulating teaching experience but can be supported at any time by pedagogical training. However, teachers may have a misunderstanding of the concepts of learning and teaching, which could also affect their professional development and the learning process of students. For example, whereas some teachers might know about constructivist epistemology from their teacher training courses, their counterparts who have not had prior pedagogical training might lack an awareness of the nature of learning, which could result in negative influences on the potential to support the active learning of students (Vosniadou et al., 2020). In other words, concepts of learning and teaching can vary among prospective, new, and experienced teachers (Meyer, 2004), and reducing any discrepancies is necessary to enhance educational quality. Thus, pedagogical training programs could be an essential solution to preventing gaps in university pedagogy among instructors, and online pedagogical courses could be an effective choice (Murtonen et al., 2019). As online teaching has become more popular at universities around the world, online pedagogical training programs should be adopted more widely to prepare and develop teachers' knowledge and skills in teaching and making pedagogical decisions, especially for novice teachers and those who are new to online pedagogy (Mohr & Shelton, 2017; Northcote et al., 2019).

Online pedagogical training programs can support teachers regarding their professional development and be tailored to the needs of university teachers (Mohr & Shelton, 2017). To make online pedagogical training effective, it is necessary to consider target participants, duration, content, and cost of the design of a course. For example, when designing a pedagogical training course for university teachers, a pertinent question would be whether experienced teachers would be interested in the pedagogical training program or how to make the course beneficial for both novice and senior teachers. For example, Laato et al. (2018) suggested that one of the benefits of an online course is its easy accessibility and the variety of available sources of materials for all learners, such as visual and auditory materials, publications, and quizzes. In addition, online courses can be updated and maintained regularly, and both teachers and learners can contribute to the content. The authors highlighted the flexibility, convenience, and cost-efficiency of these online training courses

as a solution to concerns about the locations of participants or their schedules. These online courses are innovative compared to traditional courses in terms of the teaching and learning methods used during the courses.

Online courses can be operated with multiple instructional languages and have the capability of providing immediate feedback for learners. Utilizing digital tools, online training courses include learning activities that can enhance both individual and collaborative learning through reflective and interactive tasks or peer-reviewing tasks (Laato et al. (2018). These activities provide participants with opportunities to develop their understanding of the concepts of pedagogy and reflect their actual teaching experience on learning theories. Moreover, concern about the disadvantages of online training programs compared to traditional training programs (face-to-face) regarding the emotional connection among learners in online classes seems to be no longer relevant (Wasserman & Migdal, 2019). Wasserman and Migdal (2019) found evidence for the feeling of personal connection and the atmosphere of the classroom with teacher–student and student–student communication in online courses despite a lack of the direct physical interaction in a traditional class. Based on prior research about the benefits of online pedagogical training programs, Murtonen et al. (2019) suggested comprehensive guidelines for building online pedagogy courses from both technical and pedagogical perspectives, encompassing factors such as the learning environment, learning materials, learning activities, and language setting.

The effects of pedagogical training programs have been described in various empirical studies over the past two decades. Some studies have demonstrated their positive impacts on the professional development of university teachers (Gibbs & Coffey, 2004; Gold, 2001; Murtonen et al., 2022; Postareff et al., 2007; Robinson & Hope, 2013; Ödalen et al., 2019; Vilppu et al., 2019). For example, Gibbs and Coffey (2004) and Postareff et al. (2007) conducted a pedagogical course for university teachers over 4–18 months which showed the positive effects of the training on the approaches to teaching that teachers used to support the learning of their students. However, Postareff et al. (2007) raised concerns that the process of perceptual change among teachers might require a long-term training period, and that the impact of the training varied among different groups of teachers in terms of their teaching experience. By contrast, Vilppu et al. (2019), Murtonen et al. (2022) and Ödalen et al. (2019) reported positive outcomes on the effectiveness of a short pedagogical training course on teachers' perceptions of teaching, at least among relatively novice teachers. Given these contradictory findings concerning the effectiveness of pedagogical training, more research is needed, especially on the potential of short online courses.

Purpose of the Study and Research Questions

The purpose of this study was to explore the effect of a short online pedagogical course on the professional development of university teachers from two aspects of active learning: engaging lectures and conceptions of learning that highlight the role of prior knowledge in learning. By investigating the degree to which teachers have shown any change in measured concepts, the study also expected to discover which sub-groups of teachers, in terms of their teaching experience and prior pedagogical training, benefitted most from the short online course.

To solve the main research problems, the study design posed the following questions:

1. How did the views of teachers develop after a short online course in pedagogy regarding the role of prior knowledge and providing engaging lectures?

2. Which groups of teachers with respect to their teaching experience and prior pedagogical training benefitted most from the short online pedagogical course?

Methods

Participants

Participants in this study were university teachers and doctoral students at a Finnish university, including both native and non-native Finnish speakers. They enrolled in short online pedagogical courses that utilized the learning platform UNIPS (University Pedagogical Support). The term “teachers” is used to refer to the participants for the rest of the paper. A total of 233 teachers responded to all the questionnaires in the registration survey (pretest), and 108 also completed the same questionnaires after finishing the courses (posttest). This reduction was due to the withdrawal of teachers during the courses or because the teachers did not complete all the study questionnaires. Registration and participation in the courses were voluntary, and teachers could cancel their enrollment without any harm. All teachers who registered for the courses they preferred provided their consent and received information about the research. The sample size for this study was collected from those teachers who gave their consent for their responses to be used in relevant research. All participants were coded as anonymous. Ethical approval for the study was granted by the Ethics Committee for Human Sciences of the focus university.

The sub-sample of 108 teachers who responded to both the pretest and the posttest was used for the analyses of the effect of the course. Of the 108 teachers, 62.62% did not have any previous pedagogical training (e.g., pedagogy in their bachelor’s or master’s degree programs or additional courses or workshops in pedagogy or education). In this research, teachers who had no previous pedagogical training were grouped as untrained teachers and those who had prior training in pedagogy were grouped as trained teachers. Of the sub-sample, 56.07% had less than two years of teaching experience. Teachers who had less than two years of teaching experience were considered beginners and those who had more than two years of experience in teaching were called experienced teachers. Both teaching experience and previous training in pedagogy were used to determine the background of the teachers. Considering this background, the sample (N = 108) was divided into four groups (Table 1).

Table 1

Grouping Based on Teachers’ Background

Groups	Previous pedagogical training	Teaching experience	N
Untrained beginner teachers	No	less than 2 years	46
Untrained experienced teachers	No	more than 2 years	21
Trained beginner teachers	Yes	less than 2 years	23
Trained experienced teachers	Yes	more than 2 years	17

Context and Procedure

The current study examined the effects of short online pedagogical courses based on UNIPS modules. UNIPS is an online learning platform developed from a collaborative project of eight Finnish universities that provides various free learning modules about

university pedagogy (Laato et al., 2018). The primary objective of UNIPS is to enhance the pedagogical knowledge and skills of university teachers to facilitate their teaching duties in higher education (Laato et al., 2018; Murtonen et al., 2019). UNIPS has been evaluated as having the potential to increase opportunities for pedagogy training among a large diversity of non-native Finnish-speaking teachers, doctoral students in Finnish universities, and other university staff (Murtonen et al., 2019).

The study utilized a pretest–posttest design based on enrollment in online pedagogical courses. The pretest was the survey used in the registration, and the posttest was the final survey after the teachers finished the courses. The same questionnaires about conceptions of learning and engaging lectures were used in both the pretest and posttest. Teachers were also asked about their teaching experience in higher education and whether they had participated in any previous pedagogical training before enrolling in these UNIPS modules.

The online pedagogical courses used learning activities and learning materials from the UNIPS platform and operated on the university's Moodle platform. Three short online courses were offered based on three UNIPS modules: “Becoming a Teacher,” “How to Plan My Teaching,” and “Lecturing and Expertise.” All three courses were designed and operated in the English language. The module “Becoming a Teacher” introduces teachers to the fundamental concepts of learning and approaches to teaching, and the basic elements necessary for high-quality teaching and learning, such as reflection, metacognition, and regulation, to support their students' learning. The module “How to Plan My Teaching” supports ideas about a learning-focused approach to teaching constructively. The module “Lecturing and Expertise” emphasizes how to build up pedagogical expertise and conduct engaging lectures. Learners engage in asynchronous learning by utilizing instructions and materials (e.g., explanatory videos, referenced literature) provided in each module within a given time to work on relevant assignments.

There are two periods in each module with different assignments: an individual learning period and a teamwork learning period. Communication among the instructor–learner and learner–learner groups is conducted via email and Moodle messages. Additionally, participants complete teamwork learning in groups, which involves reading their teammates' essays and providing comments. Participants can respond to feedback from their teammates. This activity provided communication and collaborative learning among participants. Upon finishing a module, participants are granted one credit. The total time for completing a module is about six weeks.

The data for the current study were collected from the three modules, which were organized in different semesters throughout 2018–2019: spring 2018, autumn 2018, spring 2019, and autumn 2019. As a participant could enroll in the course multiple times, the data chosen for this research were from the first enrollment.

Instruments

To measure teachers' concepts of learning as well as their perception of engaging lectures, new instruments were developed for this study. Six statements were designed to measure teachers' perceptions of engaging lectures. These statements were designed based on the literature about constructivism, in which a teacher is considered to play the role of a facilitator for students' learning, contrary to the traditional view of teachers as information transmitters (Murtonen et al., 2022; Södervik et al., 2022). A pool of 12 items was developed by Murtonen et al. (2022) and Södervik et al. (2022) to measure teachers' conceptions of learning. This tool was designed based on the important role of prior knowledge as a

precondition for new learning to occur, recognizing that learning is not solely represented by recalling what is learned (Murtonen et al., 2022; Södervik et al., 2022). In total, 18 statements were used in the pretest and posttest. Teachers' responses can indicate the level of agreement or disagreement with the statements. The levels ranged from 1 to 5: 1 (totally disagree), 2 (somewhat disagree), 3 (neutral), 4 (somewhat agree), and 5 (totally agree).

Data Analysis

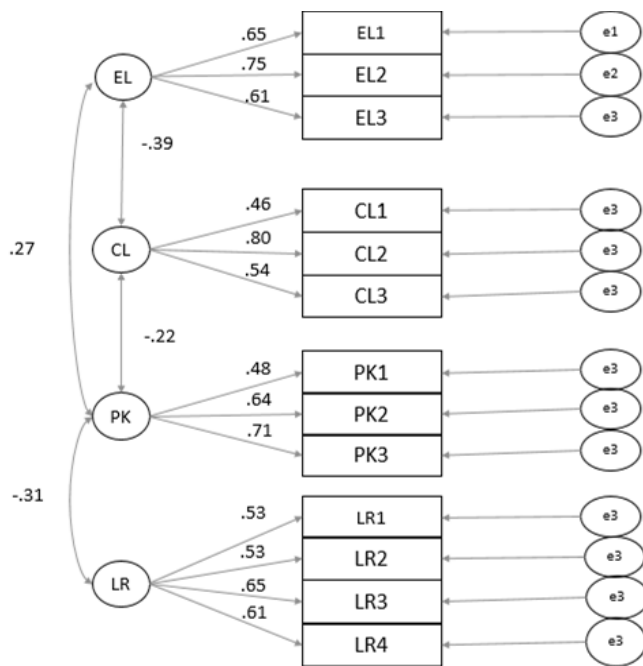
The analyses were performed using SPSS27. The validity of the instrument used was tested by exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). To explore the underlying factors provided by all 18 items, EFA was computed on the pretest sample ($N = 233$), using the maximum likelihood method of extraction with a Promax rotation (Fabrigar et al., 1999, p. 277) based on normality and an expectation of the interaction of each factor with one another. Kaiser-Meyer-Olkin test (KMO) was .695, Bartlett $\chi^2 [78] = 553.8$, and $p < .001$ indicate an adequate sample size with substantial correlation. Four factors were extracted with eigenvalues greater than 1 (Field, 2018, p. 810), explaining a total of 58.54% of variance, and corresponding items with a factor loading greater than .4 or lower than -.4 were chosen under each factor (Stevens, 2012, p. 331). The four recognized factors are the importance of prior knowledge (PK), learning as remembering (LR), effort in engaging students in lectures (EL), and challenges in engaging students (CL) (see Appendix). Subsequently, the construct was confirmed by CFA using AMOS26. The model parameters were estimated by employing a bootstrap maximum likelihood method with 2000 bootstrap samples and 95% bias-corrected confidence intervals (CIs) (Preacher & Hayes, 2008). Modification indices were checked to detect any misspecifications in the model. The goodness-of-fit of the model ($\chi^2 = 100.59$, $df = 61$, $p = .001$, $\chi^2/df = 1.65$, CFI = .92, IFI = .92, GFI = .94, RMSEA = .053, SRMR = .068) was evaluated with established indices and considered to be an adequate fit (Hu & Bentler, 1999). Standardized regression weights of items with the corresponding factors ranged from .48 to .80, at significant levels with $p < .001$ (Figure 1). Based on Cronbach's alpha values, the internal consistency of the scales in both the pretest and posttest (Table 2) proved moderately reliable (Hinton et al., 2014, p. 356). Therefore, both the validity and reliability tests can ensure the use of four scales—PK, LR, EL, and CL—in the further analysis of this study.

To answer the first research question, the study examined the development of teachers during the training on a sub-sample of $N = 108$ respondents. Preliminarily, the data had a normal distribution and showed a range of skewness of [-2.2; 1.3] and a range of kurtosis of [-1.1; 6.4]. To observe the change in teachers' views on the measured concepts, a paired t-test was used and considered with an estimate of the effect size by checking Cohen's d with three categories: $d = 0.2$ (small effect), $d = 0.5$ (medium effect), and $d = 0.8$ (large effect) (Cohen, 1998).

To evaluate the groups of teachers who benefited most from the courses, separate paired t-tests were applied to each group to observe their changes in studied perceptions from the pretest to the posttest. The p value was adjusted to .0125 because four groups were allocated from the original sample (Table 1).

Figure 1

Measurement Model with Four Constructs: The Importance of Prior Knowledge (PK), Learning as Remembering (LR), Effort in Engaging Students in Lectures (EL), and Challenges in Engaging Students (CL)



Results

The Development of Teachers' Pedagogical Ideas after a Short Online Course in Pedagogy

The teachers (N = 108) all showed increasing agreement with the idea of prior knowledge having an important role and an increasing awareness of the necessity of conducting engaging lectures. We observed that the scores for the importance of prior knowledge were higher than for learning as a remembering skill, and the awareness of engaging lectures was higher than its challenges in both the pretest and posttest (Table 2). The results of the paired t-tests revealed some significant changes in teachers' perceptions of pedagogical ideas. In particular, teachers significantly increased their agreement with the idea of creating engaging lectures and the importance of prior knowledge; they also decreased their agreement with learning as remembering (Table 2). These changes were obtained with a small effect size. However, their views on the challenges of creating engaging lectures showed a decrease over time but not a significant change, with a small effect size.

Table 2

Descriptive Statistics and the Changes in Teachers' Agreement on the Scales Used

	Cronbach's alpha		Mean (SD)		t ₁₀₇	p	Cohen's d
	Pretest	Posttest	Pretest	Posttest			
Prior knowledge is important	.64	.50	4.41 (.55)	4.63 (.47)	-4.55	<.001	.44
Learning as remembering	.67	.64	3.02 (.76)	2.68 (.68)	4.31	<.001	.42
Engaging lectures	.71	.72	3.98 (.65)	4.12(.72)	-2.46	.016	.24
Challenges in engaging lectures	.60	.62	2.19 (.71)	2.15(.77)	.592	n.s.	.06

n.s. : non-significant ($p > .05$)

The Effect of the Short Online Pedagogical Course on Groups of Teachers in Relation to Their Background

The results of a paired t-test on each group showed that the two groups of untrained teachers increased their agreement significantly with the idea of the important role of prior knowledge in creating engaging lectures, and this change had a small to medium effect size

(Table 3). Additionally, only the group of untrained beginner teachers disagreed significantly with the idea of learning as a remembering skill from the pretest to the posttest. The two groups of trained teachers did not show any significant changes during the course ($p > .0125$). Perceptions about the challenges of giving engaging lectures did not change significantly in any of the four groups. Figure 2 shows the changes in each group for the four measured perceptions during the course and the potential effects of the training on the two untrained teacher groups.

Table 3

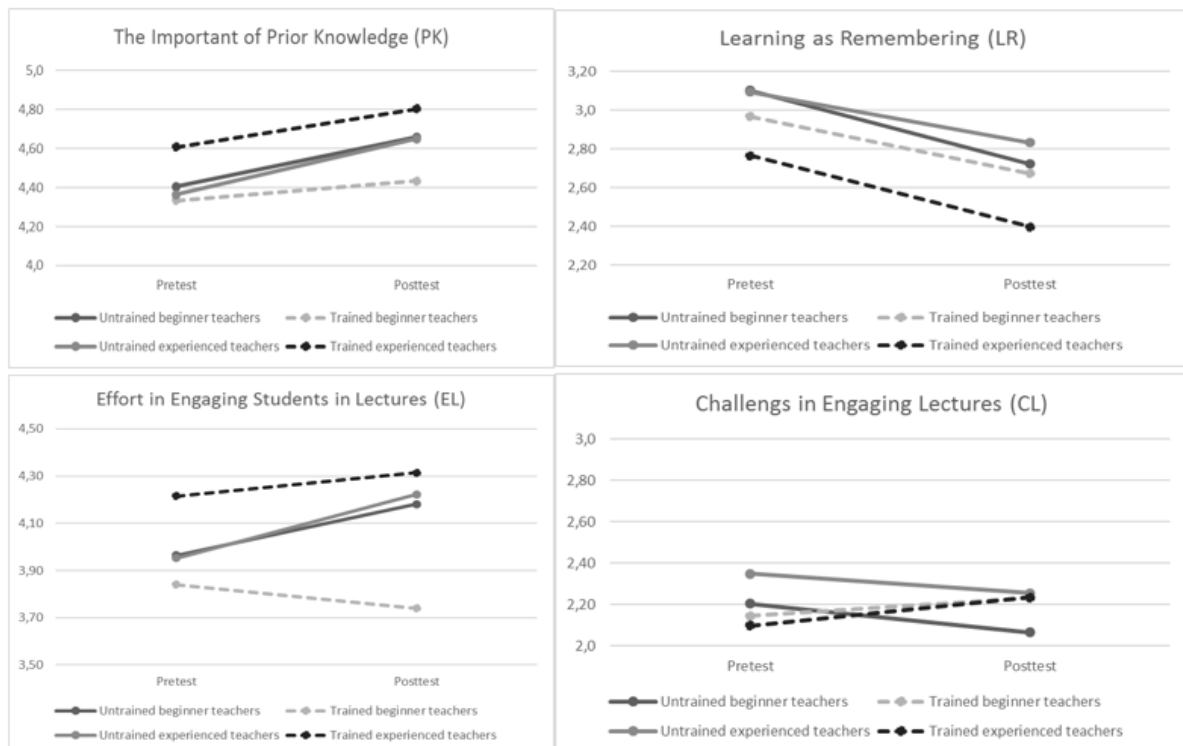
Paired T-test Showing the Development of the Untrained Teacher Groups by Their Scores on the Measured Concepts

		Pretest	Posttest	t	p	Cohen's d
		Mean (SD)	Mean (SD)			
Untrained beginner teachers	Prior knowledge is important	4.41 (0.62)	4.66 (0.43)	-3.24	<.01	.50
	Learning as remembering	3.1 (0.78)	2.72 (0.65)	2.80	<.01	.41
	Engaging lectures	3.96 (0.58)	4.18 (0.58)	-2.18	<.01	.30
	Challenges in engaging lectures	2.2 (0.67)	2.07 (0.71)	1.28	n.s	.18
Untrained experienced teachers	Prior knowledge is important	4.37 (0.6)	4.65 (0.49)	-2.9	<.01	.60
	Learning as remembering	3.1 (0.5)	2.83 (0.65)	1.79	n.s	.39
	Engaging lectures	3.95 (0.64)	4.22 (0.6)	-2.4	<.01	.50
	Challenges in engaging lectures	2.35 (0.86)	2.25 (1.03)	0.55	n.s	.12

n.s: non-significant, $p > .0125$

Figure 2

Changes in Each Group for the Four Measured Perceptions



Discussion

This study investigated the effects of short online pedagogical training courses on two aspects of active learning: the role of prior knowledge and engaging lectures. These effects were examined through self-report questionnaires that teachers answered in the pretest and posttest and analyzed to demonstrate the extent to which their perceptions changed throughout the course. Moreover, the effects of the course were also examined by considering the backgrounds of the teachers regarding teaching experience and previous pedagogical training. The findings can support the idea of the essence of constructing pedagogical training programs for teachers in higher education as well as who should be the targets for these programs.

Notably, the study found a promising effect of the short online pedagogical courses on the development of teachers' conceptions of learning and creating engaging lectures. The improvement in teachers' views of the role of prior knowledge met the expectations of the course. Teachers developed an understanding of the importance of prior knowledge, which reduced their perception of learning as a remembering skill. Meyer (2004) highlighted the importance of this change, stating that it is essential that teachers have sufficient knowledge about the nature of learning and a correct understanding of the role of prior knowledge to support students with a constructive learning process. According to Ritter et al. (2013, p. 131), naive conceptions of learning as a remembering skill could be detrimental to the potential of enhancing the active learning of students; thus, when teachers became less convinced about this idea at the end of the training, it was considered as a confirmation of the success of the course.

In this study, the development in teachers' conceptions of learning expected to strengthen a further shift in teachers' perceptions of the nature of teaching from teaching as a transmission of facts to the facilitation of knowledge construction. This shift was reflected by teachers' perception of the need to make an effort to engage students in lectures. These effects supported previous research about the relationship between teachers' conceptions of learning and the way they teach (Bolhuis & Voeten, 2004; Lee et al., 2019; Murtonen et al., 2022; Södervik et al., 2022). According to Fobes and Kaufman (2008), awareness of the need to increase teacher–student interactions represents the point where teachers understand the role of students as active agents in their learning and that teachers do not possess an exclusive authority to transmit information in their classes. These findings suggest a potential for change in teachers' conceptions of learning and, thus, a modification of their teaching practices, which is in line with the findings of Vilppu et al. (2019). Although teachers' perceptions of the challenges in engaging students did not change much during the short course in this study, the current findings proved a parallel development in the understanding of teachers of the important role of prior knowledge in creating engaging lectures. According to Murtonen et al. (2022) and Södervik et al. (2022), this parallel development is crucial across disciplines in supporting teachers to perceive the essence of teaching, the role of teachers as facilitators, and of students as active agents in their learning.

The positive effect of the short course in this study can be explained by the appropriate learning environment designed for the three modules (Become a Teacher, How to Plan My Teaching, and Lecturing and Expertise). The online learning environment with the learning materials and learning activities in these modules seemed to work effectively to activate reflection by the teachers on their situations, help them relate to new concepts from the course, and integrate these with their prior perceptions. Therefore, the effect seemed to be immediate when the information provided was interesting or related. Given that learning is a

social process (Chi & Wylie, 2014), the learning progress of teachers during the short course was supported both by individual and collaborative learning. The collaborative learning activity ensured connections and communication among learners in the courses through their engagement in the task. This design proved that online pedagogical training could be utilized as an effective method for professional development without direct meetings in a physical space (Wasserman & Migdal, 2019). In essence, the course was constructed based on the fundamentals of pedagogy and, as Teräs (2016) suggested, to support the pedagogical development of teachers by providing them with a holistic understanding of the concepts of teaching and learning.

Regarding the second research question, the findings revealed that the two groups of untrained teachers, regardless of their teaching experience, benefitted most from the course. Both groups presented significant developments in their conceptions of learning and their awareness of providing engaging lectures; the group of untrained beginner teachers seemed to gain the most benefit. Changes in the groups of trained teachers were not significant; this might be explained by their existing knowledge of the concepts measured in this study which they might have obtained through their prior studies. The observed tendencies in the groups of untrained teachers could be explained by their willingness to embrace new learning in pedagogy. This finding aligns with the results of Vilppu et al. (2019) and Murtonen and Vilppu (2020), which reveal that novice teachers benefit most from short pedagogical courses and may need this training the most. Thus, a short basic course in pedagogy can be effective in providing fundamental pedagogical concepts to new academics and can be an essential tool for sustaining teachers' pedagogical knowledge over time. Therefore, the effect of the training can be beneficial to all university teachers by enhancing their pedagogical knowledge. This result also suggests the necessity of supporting the opportunity for new or prospective teachers to access these short basic pedagogical courses.

This current study has a few limitations that could be addressed in further research. The sample size was modest; therefore, a future study needs to have a larger sample to sustain the analysis findings. To draw a stronger conclusion about the effects of the training, future research should include a control group. As Norton et al. (2005) argued, the written self-reports of teachers may not match teaching practices; therefore, a future study should have observations to detect changes in the teaching practices of participant teachers. Such observations would help researchers to understand the extent to which the outcomes reflect the actual changes in concepts generated by the courses. Ödalen et al. (2019) addressed concerns about the immediate effect of pedagogical training courses by suggesting that future studies could use interview methods during recruitment and follow-up surveys to assess how teachers reflect their knowledge in their teaching practice.

In conclusion, a six-week online UNIPS pedagogical course successfully enhanced teachers' understanding of the important role of prior knowledge in the learning process and their determination to increase the number of engaging activities undertaken with students during lectures. This result conforms with those of Vilppu et al. (2019), Murtonen and Vilppu (2020), and Ödalen et al. (2019) and contributes to promising solutions for enhancing the pedagogical expertise of academic staff through short training programs. Short online pedagogical training programs for university teachers can be an effective and efficient solution contributing to the development of active learning of students in higher education.

Declarations

The authors declare that they have no conflict of interest.

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Appendix 1

Factor loading of items on each factor

	PK	LR	EL	CL
PK1. Learning requires connecting of aspects to be learned into one's previous knowledge.	.491			
PK2. Students' previous knowledge plays hardly any role in their university studies.(R)	.679			
PK3. There is no need to activate students' previous knowledge, since everyone needs to learn the same things.(R)	.679			
LR1. Learning means that students adopt course material in detail.		.491		
LR2. If students are able to remember things that the teacher explained, they have learned.		.528		
LR3. As a result of a successful learning situation, the student is able to repeat the teacher's main message.		.721		
LR4. A skilled teacher can transmit exact knowledge for students effectively.		.598		
EL1. In my teaching, I have used teaching approaches in which students are actively involved			.642	
EL2. I often activate my students to discuss about the topic.			.779	
EL3. In my teaching, I use a lot of time to discuss with the students based on the ideas and questions that they brought up.			.605	
CL1. I would like to dedicate time for discussions or activating teaching methods but I'm not able to, because there is so much content to be taught in the course.				.490
CL2. My students could have some interesting questions, but usually we don't have time to go them through.				.779

CL3. If a student asks a question during a lecture, I would prefer answering it at the end of the lecture.

.551
