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*Published in:*  
Studies in Educational Evaluation

*DOI:*  
[10.1016/j.stueduc.2020.100966](https://doi.org/10.1016/j.stueduc.2020.100966)

**IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.**

*Document Version*  
Publisher's PDF, also known as Version of record

*Publication date:*  
2021

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

Noben, I., Deinum, J. F., Douwes-van Ark, I., & Hofman, W. H. A. (2021). How is a professional development programme related to the development of university teachers' self-efficacy beliefs and teaching conceptions? *Studies in Educational Evaluation*, 68, [100966].  
<https://doi.org/10.1016/j.stueduc.2020.100966>

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# How is a professional development programme related to the development of university teachers' self-efficacy beliefs and teaching conceptions?

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## ARTICLE INFO

### Keywords:

Self-efficacy  
Teaching conceptions  
Professional development  
Teacher development

## ABSTRACT

This study explores how the impact of a five ECTS professional development programme for university teachers affects their self-efficacy beliefs and teaching conceptions using a mixed methods approach. For the quantitative part of the study, participants completed pre-post surveys. From these surveys, we find that the programme led to an overall significant increase in reported self-efficacy beliefs. A sub-sample of ten participants participated in the qualitative part, which consists of four phases: three reflective assignments and an interview. Individual teachers demonstrate a dominant teaching conception in each phase and in almost half of the sub-sample it developed over time, moving from a teacher-centered to a more student-centered conception. When examining the development of self-efficacy and teaching conceptions collectively, three development groups are identified. Noteworthy is that teacher development is credited to the programme as a whole and not to a specific aspect.

## 1. Introduction

The recognition of the importance of effective teaching in higher education in combination with the acknowledgement of the inadequate preparation of academics for their teaching responsibilities has led higher education institutions to implement professional development (PD) activities (Saroyan & Trigwell, 2015). These activities can largely be categorised as either outcome or process-focused, where skills acquisition falls within the first category and individual meaning making in the latter. Ideally, this focus is taken into consideration when evaluating a PD activity (Amundsen & Wilson, 2012). Although Saroyan and Trigwell (2015) argue that PD activities rarely exclusively focus on either outcomes or processes, recent meta-analyses on the effect of PD interventions established that the majority of the included studies intended to advance teaching skills (Ilie et al., 2020; Steinert et al., 2016). However, the growing acknowledgement of teacher identity for teaching engagement, has led researchers to advocate for process-focused PD activities where teachers are given opportunities to explore and strengthen their identity (e.g. McCune, 2019; Steinert et al., 2016; Steinert, O'Sullivan, & Irby, 2019; Van Lankveld, Schoonenboom, Volman, Croiset, & Beishuizen, 2017;). This call to redefine PD activities is based on the premise that by focusing on teacher identity – formed by internal beliefs as well as external influences that teachers use to make

sense of themselves as teachers (Steinert et al., 2019) – a long-term impact of PD interventions is more likely (Meijer, Kuijpers, Boei, Vrieling, & Geijsel, 2017). To contribute to the less-developed literature on how process-focused PD activities affects the learning of teachers, we examine the impact of a PD programme targeted at teacher identity, which we operationalise as teachers' teaching self-efficacy beliefs and teaching conceptions. The study is guided by the following question: How do university teachers' teaching self-efficacy beliefs and teaching conceptions develop throughout a PD programme?

## 2. Theoretical frameworks

### 2.1. Self-efficacy beliefs

Self-efficacy beliefs are self-judgements of one's capabilities to successfully perform an action in a given context (Bandura, 1997). Consequently, teachers' teaching self-efficacy beliefs are self-assessments of their ability to influence students' learning. According to Bandura's (1997) social cognitive theory, self-efficacy beliefs (referred to hereafter as self-efficacy) are influenced by four sources that provide individuals information about their own capabilities: (1) mastery experiences, (2) vicarious experiences, (3) social experiences, and (4) physiological and affective states. The strongest influence on self-efficacy are mastery

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<https://doi.org/10.1016/j.stueduc.2020.100966>

Received 14 September 2020; Received in revised form 12 November 2020; Accepted 13 December 2020

Available online 28 December 2020

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experiences. For teachers, these are their own teaching experiences that positively or negatively influence student achievement and result in more or less efficacious teaching beliefs, respectively. Vicarious experiences are those in which the teacher observes the teaching of other teachers. Teachers reflect on and alter their self-efficacy by deducing information from the failures or successes from the observed peer. Self-efficacy is further influenced by teachers' social experiences, the feedback they receive on their teaching from others, and their physiological and affective states such as feelings of anxiety, stress, or excitement.

Reviewing research on self-efficacy of the last 40 years in primary and secondary education, Zee and Koomen (2016) report that teachers with a high sense of self-efficacy tend to implement effective teaching strategies as well as demonstrate psychological well-being, i.e. they are less susceptible to burnout and report higher job satisfaction. Teachers' self-efficacy is also associated with student achievement: high efficacious beliefs seem to positively link with students' academic adjustment (Zee & Koomen, 2016) and are associated with student learning outcomes (Klassen & Tze, 2014). Although, teachers' self-efficacy research in higher education is less well-established than in the earlier educational levels, several studies report similar findings; self-efficacy is positively associated with job engagement and satisfaction (Han, Perron, Yin, & Liu, 2020) and with student outcomes through reported learning gains (Daumiller, Grassinger, Dickhäuser, & Dresel, 2016) and increased classroom engagement (Fong, Dillard, & Hatcher, 2019).

Contrary to their colleagues in primary and secondary education, teachers in higher education do not receive a formal teacher education. This is partly because research and teaching have long been regarded as complementary skills (Marsh & Hattie, 2002; Quinn, 2012). While pre-service teacher education provides primary and secondary education teachers with ample sources for self-efficacy, through vicarious and social experiences, university teachers mostly lack these influences and their sense of efficacy might be mostly based on their own practices and experiences with little comparison to those of their colleagues (Fives & Looney, 2009; Morris & Usher, 2011). In their exploratory study, Fives and Looney (2009) found that levels of self-efficacy among teachers in higher education are relatively homogenous, which may be a result of the absence of sources that provide them with information about their teaching competences as they compare their effectiveness to the teachers that taught them when they were university students themselves. One way to influence university teachers with a framework of reference regarding teaching is through PD activities. The underlying assumption is that when teachers feel more confident in their teaching competencies, they tend to focus more on improving these competencies and employ more student-centered teaching methods, which in turn increases their self-efficacy (Summers, Davis, & Hoy, 2017; Tschannen-Moran, Hoy, & Hoy, 1998).

Prior research has indicated that PD programmes increase university teachers' self-efficacy (Ibrahim, Clark, Reese, & Shingles, 2020; Pekkarinen & Hirsto, 2017; Tenzin, Dorji, Choeda, & Pongpirul, 2019) as well as indirectly influence them to be more student-focused in their teaching by increasing their sense of competence (Fabriz et al., 2020). This appears to be especially true for teachers who have limited teaching experience (Postareff, Lindblom-Ylänne, & Nevgi, 2007), as teaching experience correlates with self-efficacy (Woolfolk Hoy & Spero, 2005). University teachers who had low self-efficacy scores at the start of the PD programme demonstrated the most growth in terms of being reflective in their teaching practice (Nevgi & Löfström, 2015). These results are not surprising as self-efficacy is more prone to change early in learning and seem to be rather stable once established (Bandura, 1997; Morris & Usher, 2011). However, there is some evidence that teachers' self-efficacy can also reduce as a result of a PD activity. Postareff et al. (2007) suggest that the length of PD programmes matters for increasing self-efficacy as short activities may make teachers more uncertain about their teaching abilities. In their study, the group of teachers who engaged for more than a year in a PD programme scored higher than the

group who did not take part in any PD activities. However, another group of teachers that had up to a year participation in a PD programme scored lower than the "no participation" group. This drop in self-efficacy can be attributed to teachers' reassessment of their ability in light of the PD activity; they become more uncertain about their teaching abilities because they become more aware of what it means to teach effectively (Postareff et al., 2007; Tschannen-Moran & McMaster, 2009). On the other hand, according to Wheatley (2002), there are also some beneficial effects of a certain level of doubt for teacher development. Since doubting one's capabilities fosters disequilibrium in one's thinking, which in turn results in development due to the psychological need to resolve the disequilibrium. A high level of self-efficacy is therefore not always preferable since some level of uncertainty is required to engage in changing one's teaching practice (Korthagen, 2004; Wheatley, 2002).

## 2.2. Teaching conceptions

Conceptions of teaching describe teachers' views about teaching (i.e. the way they think about teaching and learning). In the literature, two contrasting conceptions can be distinguished: the teacher- or content-focused and the student- or learning-focused conception of teaching. In the teacher-focused understanding, teaching is conceived as the transmission of knowledge to students. In the student-focused understanding, teaching is focused on students' learning and development (Barnett & Guzmán-Valenzuela, 2017). The student-focused conception has been recognized as the more sophisticated, and preferable, understanding of teaching as it entails a comprehensive understanding of the relationship between teaching and learning (Entwistle, Skinner, Entwistle, & Orr, 2000).

To support teachers in developing such an understanding of teaching, universities are encouraging them to participate in PD activities. To examine the impact of PD in higher education, Stes, Min-Leliveld, Gijbels, and van Petegem (2010) synthesized the literature until 2008 and found eight studies that specifically focused on the effect of PD on teachers' conceptions of teaching. Although most studies reported an increase in student-centred understanding of teaching after the PD activity, Gibbs and Coffey (2004) found a mixed effect of the PD activity on teachers' conceptions of teaching. Compared to the pre-test, more student-focused understanding of teaching was present in the post-test while at the same time no change in a transmission-focused understanding of teaching could be noticed. More recent studies have continued to confirm the impact of PD on teachers' teaching conceptions by reporting an increase in student-centeredness in teacher thinking (Nevgi & Löfström, 2015; Stewart, 2014).

These studies dichotomize conceptions into a teacher- and student-focused understanding of teaching. However, in between the two extreme conceptions, intermediate categories can be found (Entwistle et al., 2000). Åkerlind (2003) theorizes that teachers develop their understanding of teaching along a cumulative path: a focus on teacher transmission, a teacher-student relations focus, a focus on student engagement, and a focus on student learning. While developing their thinking about teaching, teachers experience their own development along the following dimensions: increasing their confidence with teaching, expanding their teaching knowledge and skills, and eventually focusing on students' learning. Taken together, Åkerlind (2003) presents a seven-stage hierarchy of expanding understanding of teaching and teaching development: 1) teacher transmission combined with teacher comfort, 2) teacher-student relations combined with teacher comfort, 3) teacher-student relations combined with teaching practice, 4) student engagement combined with teacher comfort, 5) student engagement combined with teaching practice, 6) student learning combined with teaching practice, and 7) student learning combined with student learning (see Appendix A). With this hierarchy, Åkerlind (2003) suggests that a more advanced teaching conception can precede a more expanded understanding of their own development as teachers. This is illustrated by two examples. In stage four 'student engagement combined with

**Table 1**  
Structure and Content of the PDFT (5 ECTS).

Contact Sessions	Assignments	Study load
Study week		40 h
Course design		
Active learning		
Pedagogical-didactic classroom behaviour		
Observation training		
Microteaching activity		
Tutoring		
	Microteaching reflective report	4 h
	2 Peer observations and Reflective writing reports	16 h
Module 1		16 h
Tutoring		
Assessment		
Intervision session		
	Teaching case	16 h
Module 2		16 h
Motivating students		
Presentations of teaching case		
Differentiation		
	2 Peer observations and Reflective writing reports	16 h
Module 3		16 h
Presentation design - Storytelling		
Curriculum design		
Intervision session		

teacher comfort', while teachers consider the importance of active learning, they are mainly concerned with gaining confidence in their teaching. In stage six 'student learning combined with teaching practice', teachers think of teaching as supporting students in developing as independent learners. At the same time, they are focused on expanding their knowledge and skills; their primary focus is on their own experience as a teacher in the teaching and learning process and not yet on that of the students. By overlooking the complexity of teacher development, previous studies on the effectiveness of PD programmes may have underreported the impact on teachers' teaching conceptions.

### 3. Method

#### 3.1. Research design and question

This study is part of a larger five-year research project on the impact of PD programmes on teaching quality. As a first study in the project, we opted for a longitudinal convergent mixed methods design (Creswell & Plano Clark, 2011) in which we first collected and analysed the quantitative and qualitative data independently before the results are compared and interpreted collectively. We pose the following research question: How do university teachers' teaching self-efficacy beliefs and teaching conceptions develop throughout a PD programme? In light of the results of the literature, we hypothesize that teachers' self-efficacy beliefs increase during the PD programme. As a second hypothesis, we propose that teachers develop from a teacher-focused to a student-focused teaching conception along the development path theorized by Åkerlind (2003). Based on these results we construct development types and explore the differences between them by examining participants' key learning experiences in the programme.

#### 3.2. Professional development programme

The context of this study is a PD programme on Fundamentals of Teaching (referred to hereafter as the PDFT) for teachers in tertiary education institutions in Poland. This programme was developed as part of a European project to support the development of Polish university

teachers since institutional opportunities for professional learning are scarce (Szplit, 2017; Zbróg, 2014). As stated in the introduction, the PDFT primarily focuses on supporting the development of academics' teacher identity without neglecting the importance of teaching skills, such as providing clear and structured instructions. With a development perspective in mind, the PDFT was designed as year-long programme consisting of a one-week study visit at a partner institution in the Netherlands and three follow-up two-day modules in Poland (Table 1). The course combines theory of university teaching and learning with practice and reflection to allow participants to connect what they have learned to their own context. Example activities are group discussions, microteaching, video observation training, case studies, and intervision sessions. In between the contact sessions, participants are required to complete various assignments which are used as input for the next contact session, such as peer observations of teaching, reflection reports about the observations, and a collaborative teaching case. Participants are supported by a designated, experienced facilitator throughout the course and receive additional support from several educational advisors during the study visit.

Recommendations from research on the nature of effective PD programmes were taken into consideration when designing the course: an intensive programme of five ECTS that includes a workload of 140 h of which 88 are contact hours (Desimone, 2009; Garet, Porter, Desimone, Birman, & Yoon, 2001) and that is spread over time (Desimone, 2009; Garet et al., 2001; Stes et al., 2010; Steinert et al., 2016), integration of theoretical concepts with active learning opportunities and authentic work experiences (Desimone, 2009; Garet et al., 2001; Meijer et al., 2017; Tynjälä, 2008); importance of a facilitator to support community building, provide feedback, and stimulate reflection (Margalef & Roblin, 2016; Meijer et al., 2017; Steinert et al., 2019); and interaction with and feedback from peers to foster reflection (Pekkarinen & Hirsto, 2017; Saroyan & Trigwell, 2015). The design further took into account the four sources of self-efficacy, for example: a microteaching activity and peer observations to stimulate vicarious learning; group activities and intervision sessions to foster social experiences; and time in between the contact sessions to create mastery experiences by implementing what participants have learned in their own context. Throughout the programme the experienced facilitators paid attention to establishing a safe learning environment and creating a sense of community to reduce feelings of stress and anxiety, thus addressing participants' physiological and affective states.

#### 3.3. Data collection and sample

##### 3.3.1. Quantitative component

The quantitative aspect focuses on two groups who completed the PDFT simultaneously in 2019: a group A of 20 participants and a group B of 21 participants. Since two participants did not provide consent to use their data for research, the final sample consists of 39 university teachers who completed pre-post self-reported measures regarding self-efficacy. Of these participants, 28 were female and 11 were male. The average teaching experience was 14.68 years (SD = 7.67) for 38 out of the 39 participants since one participant did not specify this. Most of the participants obtained a PhD (n = 36), of which six also obtained a habilitation qualification. Three participants listed a Master degree as their highest obtained qualification. The voluntarily enrolment process lead to multidisciplinary groups: 14 participants from STEM disciplines (e.g., Computer Sciences, Biology, Mathematics), 12 participants from Social Sciences (e.g., Psychology, Educational Sciences, Economics), 7 participants from Arts and Humanities (e.g., History, Languages), 4 participants from Medicine, and 2 participants from Law.

Participants received a web-based Qualtrics survey twice: a pre-survey before the start of the PDFT and a post-survey after the PDFT finished. The survey, which is based on the Teachers' Sense of Efficacy Scale (TSES) (Tschannen-Moran & Hoy, 2001), includes 26 items. The items ask participants about 'how certain they are they can ...' on a



**Table 2**  
Participants' Characteristics.

Pseudonym	Discipline	Highest degree	Time spend on research/teaching/other	Years of teaching experience in HE	Group
Maja	STEM	PhD	60/40	18	A
Emma	STEM	Master	25/65/10	8	A
Emilia	Social Sciences	PhD	20/60/20	15	A
Martyna	STEM	PhD	50/40/10	17	A
Wictoria	Humanities	PhD + Habilitation	40/50/10	20	A
Gabriela	Law	PhD + Habilitation	60/40	18	B
Oliwia	Social Sciences	PhD	40/45/15	12	B
Adam	Humanities	Master	10/75/15	5	B
Dawid	Humanities	PhD	5/75/20	23	B
Eliza	Medicine	PhD	20/50/30	15	B

7-point scale ranging from 'not certain at all' to 'absolutely certain'. Example items are: How certain are you that you: can motivate students who show low interest in learning, help your students to think critically, ensure the link between the learning outcomes and the assessment methods when designing a course? Participants were asked to keep the course they focused on throughout the PDFT in mind when responding to the items. Although we are aware of the multidimensionality of self-efficacy (cf. Fong et al., 2019), in this study we look at the construct teaching self-efficacy in general.

3.3.2. Qualitative component

Selection of the participants for the qualitative component was based on the five-day travel scheme. All 39 participants received an invitation email for a retrospective semi-structured interview. Interviews were held in four cities in Poland in November 2019. Based on the travel logistics, consent, and availability of the participants, ten teachers - five of each group - were included in the study (Table 2). The first and third author jointly conducted the interviews, except when two interviews were scheduled on the same time. The interview protocol (see Appendix B) was tested beforehand during an online session with a participant of another group not included in this study. Each interview started with a pre-interview activity that asked participants to visualise their key learning experiences in the course on paper. Afterwards, questions were asked to gain more insight in these learning experiences and participants predominant teaching conception at that point in time. The interviews lasted on average 45 min and were audio-recorded and transcribed verbatim by a research assistant who is a Polish native speaker. The reflective writing assignments were an integral aspect of the course (Table 1).

Participants submitted five reflective writing reports throughout the course: one reflection on their microteaching within two weeks after the study visit, two reflections on the feedback they received from a peer after being observed by that peer (one before module 1 and another before module 3), and two reflections on observing a peer's teaching (one before module 1 and another before module 3).

3.4. Ethical considerations

Approval for the study was obtained from the Ethics Committee of the Teacher Education Department of a Dutch university. Participants were informed that their course activities (i.e., the reflective writing assignments) are subject to research through a written research privacy statement. This statement was uploaded to the online learning environment at the start of the PDFT. Oral and written information about the surveys and interview was provided beforehand, and participants signed a consent form. The privacy statement as well as the consent forms informed participants that their participation was voluntary and that they could withdraw from the study at any time without consequences. Finally, to regard confidentiality, all documents were anonymized by a research assistant. After the analysis, the codes identifying the participants were replaced by a pseudonym for the purpose of reporting the results by a research assistant.

3.5. Data analysis

We conducted a dependent sample t-test in Rstudio version 1.2.5033 to examine participants' self-efficacy beliefs at the start and at the end of the PDFT. The reliability of the self-efficacy scale of 26 items was good ( $\alpha = 0.91$ ).

The reflective writing assignments were considered a unit of analysis when they were collected at the same time. This means that the two reflection reports that were due before module 1 were combined as one unit, the same is true for the reports due before module 3. This resulted in four units of analysis per participant collected at four measurement phases in the programme (Fig. 1): three reflective writing reports – the microteaching report and the two reflection reports – and the interview. The first two authors independently reviewed the reports and the transcripts of all the interviews using a closed-coding approach based on Åkerlind's (2003) theory of teacher development (see Appendix A). Initially, the agreement between both raters was 59 %. The discrepancies in ratings between the researchers were resolved through discussion until a consensus was reached. All documents were coded by both authors using the qualitative data analysis tool RQDA.

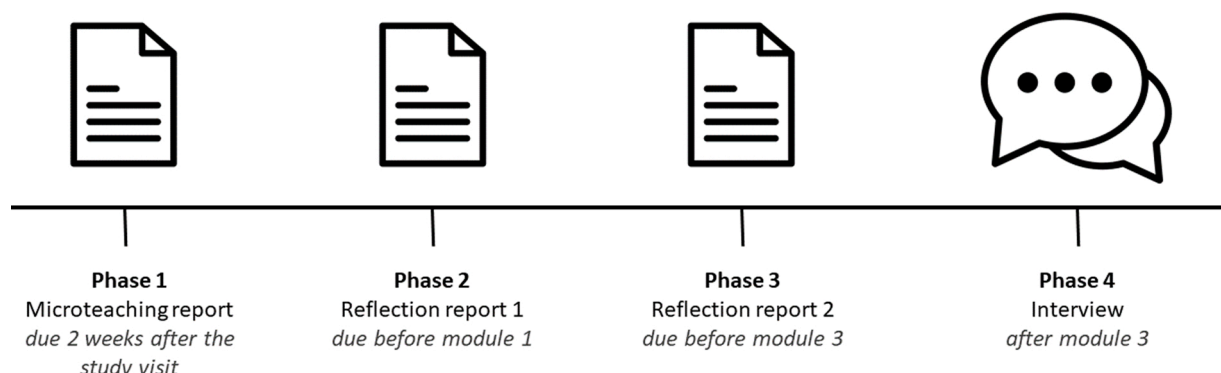


Fig. 1. Qualitative Data Collection in Four Phases in the PDFT.

**Table 3**  
Participants' Teaching Conceptions and Understanding of Teaching Development in Four Phases of the PDFT.

	Åkerlind's (2003) stages of teacher development	Maja	Martyna	Dawid	Emilia	Eliza	Oliwia	Wictoria	Emma	Adam	Gabriela
Teacher-focused teaching conception	Teacher Transmission - Comfort	1, 2						2			
	Teacher Transmission - Practice <sup>a</sup>		2					3			
	Teacher - Student Relations - Comfort		1, 3, 4	1, 3			1	1, 4	1		
	Teacher - Student Relations - Practice			2	1, 2	1	3, 4		2, 3, 4	1, 2, 3, 4	1, 2, 3, 4
Student-focused teaching conception	Student Engagement - Comfort			4							
	Student Engagement - Practice	3, 4			3	2, 3					
	Student Learning - Practice					4	2				
	Student Learning - Student Learning					4					

1 = Microteaching report, 2 = Reflective writing report 1, 3 = Reflective writing report 2, 4 = Interview.

<sup>a</sup> This phase was added when we jointly considered the coding results of participants' teaching conceptions and understanding of their development.

## 4. Findings

### 4.1. Self-efficacy beliefs

To test the hypothesis that the teachers' self-efficacy increased during the PDFT, a dependent sample *t*-test was performed. Prior to conducting the analysis, the assumption of normally distributed difference scores between the results scores on self-efficacy in the pre- and post-survey was examined and satisfied, as the skew and kurtosis levels were estimated at 0.82 and at 1.83, below the threshold of  $|2.0|$  and  $|9.0|$ , respectively (Wiedermann & Alexandrowicz, 2011). On average, participants reported a higher self-efficacy at the end of the PDFT ( $M = 5.62$ ,  $SD = 0.65$ ), in comparison to before the start of the programme ( $M = 5.06$ ,  $SD = 0.69$ ),  $t(38) = -4.77$ ,  $p = .000$ ,  $\Delta M = -0.56$  (95 %CI:  $-0.80/-0.32$ ).

After establishing the change in self-efficacy in the larger sample, we examined the results of the ten participants included in the qualitative component of this study. The results show noticeable differences between these participants. Some participants - Emilia and Eliza - reported a relatively large increase in their self-efficacy. While others - Emma, Gabriela, Wictoria - indicated almost no change.

### 4.2. Teaching conceptions

#### 4.2.1. Dominant teaching conceptions

We analysed the reflective writing reports and the interviews to examine what conceptions of teaching participants reported at the four phases in the PDFT: 1) microteaching report, 2) first reflective writing report, 3) second reflective writing report, and 4) the interview. A teacher-focused teaching conception is characterised by descriptions of what the teacher is doing with a limited awareness of the role of the student in the teaching-learning process. For example, Oliwia writes in her reflection on the microteaching activity (phase 1): *'I tend to be in good contact with my group - guiding the process, interacting with them and involving them in the process. I am also able to keep quiet and listen to what my students want to say. I think my lecturers are not boring - the things I say and how I say them are interesting.'* On the other hand, when teachers hold a student-focused teaching conception, their main concern is to engage students with the learning activities to motivate them and develop their skills. For example, Emilia reflects about observing a peer in her second reflective writing report (phase 3) as follows: *'There were students in the back of the room who struggled a lot. The girls seemed to be shy, embarrassed and passive. They didn't know what was going on, and they did not try to find out. However, they tried to adjust and not to stand out. Secretly, they started using their smartphones. [...] The teacher could join the group and model the proper activities [...]. They needed more attention and more instruction.* Our analysis revealed a dominant conception in each phase of the PDFT (Table 3).

#### 4.2.2. Development of teaching conceptions

All participants displayed a primarily teacher-focused understanding of teaching, either a teacher transmission or a teacher-student relations conception of teaching, in their microteaching reflective writing reports (phase 1). Most of them held a teacher-student relation conception of teaching, with the exception of Maja who is teacher transmission-focused in her microteaching report. In four cases - Maja, Dawid, Emilia, and Eliza - the conception changed throughout the PDFT from a teacher- to a student-focused understanding of teaching, either a student engagement or a student learning conception (Table 3). A student engagement conception is already noticeable in Eliza's first reflective writing report (phase 2). Maja and Emilia reveal a student-focused understanding in their second reflective writing report (phase 3). While in the case of Dawid, a student engagement understanding only became apparent during the interview (phase 4). When holding a student-focused conception, Emilia and Eliza are the only two participants who developed their understanding of teaching to a student learning one by the time of the interview.

The other six participants expressed a teacher-focused conception of teaching in each of the four phases. Whereas Emma, Adam and Gabriela's understanding of teaching appears to be stable throughout the PDFT - a teacher-student relations understanding was identified as the dominant conception in every phase of the PDFT - Martyna and Wictoria altered their understanding between a teacher transmission and a teacher-student relations conception. Finally, Oliwia mainly holds a teacher-student relations conception throughout the PDFT except in phase 2, in which she reveals a student learning conception.

To illustrate how the development of teaching conceptions took place two examples - Maja and Gabriela - are provided. Early in the PDFT, Maja mostly demonstrated a teacher transmission conception of teaching. In her understanding, teaching should focus on covering the content so that students will be able to pass the course. This conception is recognized in her microteaching report as well as in the first reflective writing report.

*"At university we must convey a lot of content in very short time. The lecture must be well organized and correct but we are not responsible for students who have too little knowledge to understand the lecture. Students are required to analyze the lecture, ask questions and fill the gaps in their education by themselves."* (Maja, Microteaching report - phase 1)

*"Passing exams require from students extensive knowledge and ability how to apply it. So when I give students time to play with cards or do something in groups usually some ideas must be omitted and significantly less students pass their exams. [...] The whole lesson is usually a discussion with students. I ask the questions which help students to move forwards and solve problems in ordered way. Usually I translate them some theory, demonstrate algorithms and well known methods. Despite the fact that they must take part in the discussion and do some exercises on the blackboard, they have too little opportunity to do individual work during the lesson. My lessons are intended for weaker students. Those who are more interested in the topic usually have some extra tasks as*

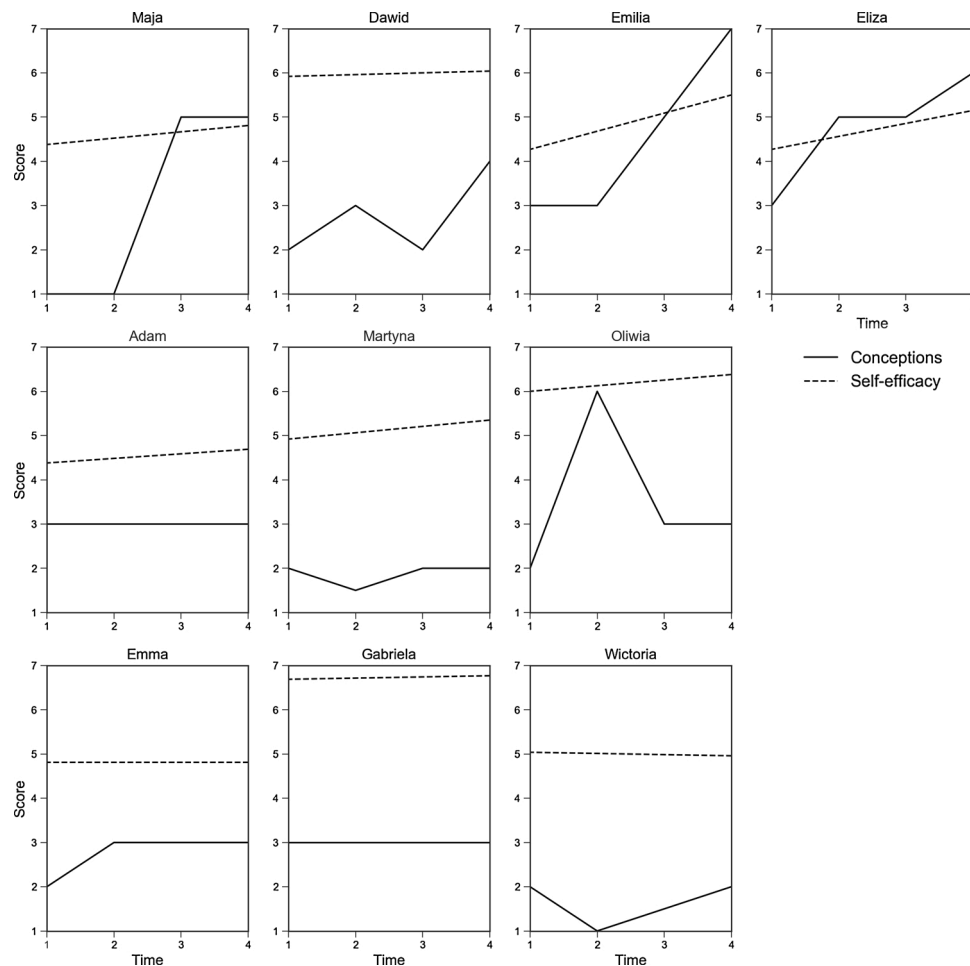


Fig. 2. Participants Categorised in Development Type: Growth (Row 1), Confidence (Row 2), and No Development (Row 3).

homework and stay after the lesson to ask the questions.” (Maja, Reflective writing report 1 – phase 2)

Later in the PDFT, Maja changed her teaching conception to a student-centred one. A student engagement understanding of teaching is visible in Maja’s second reflective writing report (phase 3) as well as in the interview (phase 4). In contrast to her earlier reports, she focuses less on what she, as a teacher, does and instead more on what the students are doing.

“Lately I made an exam with open questions and ask students to check it in groups. They were given papers with sets of questions of the same type as they were writing on the exam. They could discuss in groups but each person was responsible for the assessment of one paper. They were discussing not only about the solutions but also about assessment criterium. It turned out that they checked the exam quite well.” (Maja, Reflective writing report 2 – phase 3)

“I started to work in groups, because when I was working in groups there were many teachers, because each group had its own leader that could answer questions of peers. [Before] I did everything on blackboard [...]. So I was discussing with students, they were coming to the blackboard, they were writing on it, but everything was just around the blackboard. Now [...] I can observe them. They are more active, definitely more active, I have much more questions. These questions are in groups. So they are not threatened when the questions are sometimes stupid, so it’s not easy to admit that you cannot understand something. When they are in small groups then they feel safe and they discuss difficulties more freely. And after working in groups we have summaries on blackboard and groups present what they solved and sometimes the solutions are joined

and we get the bigger problem solved by particular parts.” (Maja, Interview – phase 4)

As indicated, Gabriela’s teaching conception did not change throughout the PDFT. Although she refers in the interview to a change in her understanding of teaching, she predominantly describes teaching from a teacher-focused perspective; focusing on what the teacher does within the student-teacher relationship in all four phases.

“I also noticed that I should give the students more time to analyze the issue on their own, or in small groups, to persuade them to think creatively. I should try to hear more from students instead of speaking for yourself. Do not take away the chance for students to solve the problem themselves, with my help.” (Gabriela, Microteaching report – phase 1)

“In the future I will try to encourage students to be more active during my lectures. [...] I will use more learning tools in the future. I have observed that it works, and students are more satisfied. I know now that a good atmosphere is also important.” (Gabriela, Reflective writing report 1 – phase 2)

“After this lecture I decided to use the Internet resources more often. I see that it’s easier to reach young people.” (Gabriela, Reflective writing report 2 – phase 3)

“So before, as I told you, nobody talked to us about teaching, so for me good teaching was this teaching which I observed as a student. So my experience was that the lecture is lecture, so somebody talk to me and I should make notes. [...] And workshops, somebody talk to me and I should make notes, so it’s the same. [...] That was my vision of lectures and workshops. And now I see this from another point of view connected

**Table 4**  
Aspects of the PDFT Identified as Key Learning Experiences.

		Elements of the PDFT		Instructional focus of the PDFT						Social exchange		
		Micro-teaching	Peer observations	Course design	Active learning	Assessment	Instructional technology	Differentiation	Story-telling	Curriculum design	Facilitators	Peers
Type 1	Maja		X	X	X	X						X
	Dawid		X		X		X				X	X
	Eliza	X	X		X		X			X		X
	Emilia			X	X	X		X	X			X
Type 2	Adam						X				X	
	Martyna	X	X		X				X		X	X
	Oliwia	X		X	X		X	X		X	X	X
Type 3	Emma	X	X	X	X	X		X			X	X
	Gabriela		X	X	X							
	Wictoria				X						X	X

*with teaching, so good teaching is efficient teaching, so I should think about learning outcome and result and all material it is not so important to present all topics from my knowledge, but the most important is that students are interested in my topics, are engaged, feel well and is activated by me. And this is the new vision of teaching of didactics.” (Gabriela, Interview – phase 4)*

#### 4.2.3. Development of awareness of teaching development

Next, we investigated what understanding of their own development as teachers participants revealed throughout the PDFT. Corresponding to Åkerlind’s (2003) theory of teacher development, almost all participants described their growth mainly in terms of becoming more confident as a teacher or increasing their knowledge and skills (Table 3). Martyna experienced her development in the microteaching as an increase in confidence: ‘All in all, I now believe that it was a very good learning experience for me. It gave me a boost in self-confidence to hear that my teaching is generally ok.’ While Adam seized the activity as an opportunity to identify aspects of his teaching practice that needs work: ‘I need to focus on a system of injecting more such interactive segments into my teaching. Given time constraints, I will not able to do it all at once, but I want to make a long-term commitment to gradually improving teaching quality.’ The only participant who demonstrated an awareness of her development in terms of student learning is Emilia, in her interview: ‘So I decided “What is my purpose?” I asked myself “What do I want?” And I decided that I want to make as many possibilities to learn as possible [...] I told students, as long as you learn, exam is perfect moment to learn [...] because you are graded and you can talk together and you can learn from each other.’

#### 4.2.4. Hierarchy of teaching and teaching development

When simultaneously considering participants’ teaching conceptions and understanding of their development throughout the PDFT, there is indication that they largely develop along the seven-stage path proposed by Åkerlind (2003): from a teacher transmission teaching conception combined with a teacher comfort focused awareness of teaching development (stage 1) to a student learning teaching conception combined with a student learning focused awareness of teaching development (stage 7). Table 3 presents participants’ development throughout the PDFT. In two instances our analysis revealed a stage that does not fit within Åkerlind’s (2003) theorized development path; a teacher transmission teaching conception combined with a teaching practice focused awareness of teaching development was detected in Martyna’s reflective writing report 1 (phase 2) and in Wictoria’s reflective writing report 2 (phase 3). Another exception to Åkerlind’s theory is that while three participants – Martyna, Wictoria, and Oliwia - demonstrate a more advanced understanding of teaching and teaching development in an earlier phase in the PDFT, a less sophisticated one is present in a consecutive phase. For example, Oliwia demonstrates a student-learning teaching conception in phase 2. However, this understanding was not present in the later two phases, in which she reveals a predominant

teacher-student relations teaching conception.

#### 4.3. Development types

After analysing both data components separately, we interpreted the results simultaneously. Based on participants’ collective changes of their self-efficacy beliefs and their combined teaching conceptions and understanding of teaching development, three development types were identified. In Fig. 2 the scores on self-efficacy as well as the development along the 7-stage hierarchy of Åkerlind (2003) are plotted. It should be noted that self-efficacy was measured on two occasions, at the start and at the end of the PDFT, whereas conceptions were measured four times throughout the PDFT. Although Fig. 2 presents the combined understanding of teaching and teaching development, we based our classification on the shift in teaching conception. The three types that can be recognised are: 1) development as an increase in self-efficacy combined with a shift towards student-focused teaching conceptions (growth type), 2) development as an increase in self-efficacy but no progression in teaching conceptions (confidence type), and 3) no development.

##### 4.3.1. Group 1: growth type

Four participants reported a (slight) increase in their self-efficacy and changed their teaching conceptions. In the beginning of the PDFT, Maja, Dawid, Emilia, and Eliza all displayed a teacher-focused teaching conception but completed the programme with a student-focused teaching conception and an increased confidence in their teaching skills.

##### 4.3.2. Group 2: confidence type

Three other participants reported a (slight) increase in their self-efficacy but did not change their understanding of teaching and teaching development. Adam, Martyna, and Oliwia mainly demonstrated a teacher-student relations teaching conception throughout the PDFT.

##### 4.3.3. Group 3: no development

The three remaining participants did not change their self-efficacy nor their teaching conceptions throughout the PDFT. Emma, Gabriela and Wictoria primarily reported a teacher-student relations conception in all four phases of the PDFT.

#### 4.4. Key learning experiences in the PD programme

In an attempt to explain the differences between participants in the different development types, we looked at the aspects of the PDFT they identified as key learning experiences in the pre-interview activity and during the interview (Table 4). No clear distinction between the participants in the three types was found. Almost all participants mentioned the conversations with their peers in the PDFT group - with the exception of Adam and Gabriela - and the theory and practice on active learning - except Adam - as aspects of the PDFT that impacted their learning. Other frequently mentioned elements of the PDFT were the



peer observations, conversations with the facilitators, and the instructional focus on course design and instructional technology. Other activities and topics of the PDFT, such as the microteaching activity, assessment, differentiating between students, storytelling, and curriculum design, were less often indicated as a key learning experience.

## 5. Conclusions and discussion

The purpose of this study was to explore how university teachers' self-efficacy beliefs and teaching conceptions developed throughout a PD programme that primarily focuses on exploring teacher identity. Our first results confirm earlier research that teachers increase their self-efficacy beliefs throughout a PD programme. Next, we considered the theorized hierarchical development of teaching conceptions and awareness of teaching development. Over the course of the PD programme, participants largely develop along Åkerlind's (2003) predicted path. When studying both findings simultaneously, three development types can be noticed: 1) a growth type – characterised by increasing in self-efficacy as well as altering teaching conceptions to become student-focused, 2) a confidence type – defined by solely increasing self-efficacy, and 3) no development – no change in self-efficacy or teaching conceptions was detected. We further attempted to understand the differences between participants' development types by looking at their key learning experiences in the programme. However, no distinct differences between the teachers in the three development types were found. This finding confirms the conclusion of various meta-analyses that indicate that the effectiveness of PD programmes is related to the programme as a whole and cannot be contributed to a specific aspect (Ilie et al., 2020; Stes et al., 2010).

Regarding Åkerlind's (2003) proposed hierarchy of expanding understanding of teaching and teaching development, although most participants generally seem to develop along the predicted path, there is also some discontinuity in the development. Three participants slightly deviated from the theorized linear development path. For these participants, a more sophisticated understanding of teaching and teaching development was present in an earlier phase in contrast to in a consecutive one. Postareff et al. (2007) argue that this (temporarily) fall back on a less advanced conception may be due to a feeling of uncertainty about one's ability to teach according to the more advanced understanding. The plausibility of this reasoning can be found in Illeris (2014) concept of regressive transformative learning: when a situation is perceived as too challenging, teachers can choose to accept this and withdraw to a position in which they feel more confident. Also, since Åkerlind (2003) regards the concepts as inclusive - in which a more complex understanding includes a previous, less advanced understanding - a demonstration of an earlier conception while at the same time understanding teaching in a more complex way is possible. It is unclear whether the discontinuity in development was actually caused by stress or feeling insecure since we measured self-efficacy before and after but not during the PDFT.

Another outcome regarding participants' development of conceptions is their transition from a teacher- to a student-focused understanding of teaching combined with their understanding of their own teaching development. We found that four participants changed their teaching conception from a teacher- to a student-focused one throughout the PDFT. The other six participants, however, demonstrated a teacher-focused understanding of teaching throughout the programme. Of these six, two participants did not change their conception of teaching and teaching development. They revealed a *teacher-student relations - practice* understanding in every phase of the PDFT. This can be explained by Dall'Alba and Sandberg's (2006) model of professional development. Although they acknowledge the stage-wise progression of skill development, they also argue that development consists of a horizontal and vertical dimension. On the horizontal

dimension, professionals focus on improving a particular skill. We argue that this corresponds to learning that is directed to knowledge and skills, which does not qualify as transformative learning. Professionals who develop along the vertical dimension focus on expanding their understanding of the practice; transformative learning. Some professionals may develop on both dimensions while others might only progress horizontally. One may argue that this is what is happening to the seemingly stagnant participants, they are focusing on improving their teaching skills but are not progressing in their understanding of teaching. This is in line with earlier studies that identified that some teachers focus on expanding their teaching repertoire but demonstrate little engagement in reflective activities, which are crucial for transformative learning, when participating in PD programmes (Nevgi & Löfström, 2015; Stewart, 2014).

Although it is difficult to make generalizations based on our small sample size, when studying the three development types, teachers' self-efficacy did not seem to be indicative of the development of their teaching conceptions. Teachers with a similar level of self-efficacy developed differently. There is also an indication that a high level of self-efficacy at the start of the PDFT could have interfered with the development of teaching conceptions. We argue, in line with Wheatley (2002), that a certain level of doubt about one's competence is necessary for change. Further, it appears that teachers with a strong belief in their teaching abilities at the start of the PDFT did not report more advanced teaching conceptions. Since we measured self-efficacy at the start and at the end, we cannot establish if teachers experienced a drop in their teaching confidence – for example half-way through the programme – before becoming more certain about their teaching abilities again, as indicated in the study of Postareff et al. (2007). As a natural progression of this work, the results should be corroborated in a larger sample to establish a validation of the self-efficacy scale and to determine whether the development types could be determined by a profile analysis.

A noteworthy characteristic of our sample is the high level of teaching experience; 30 of the 39 teachers had more than 10 years of teaching experience. Although we cannot make statements about the relationship between self-efficacy and teaching experience due to the imbalance in our sample with regard to experience, our results suggest that also highly experienced teachers' self-efficacy beliefs can increase throughout a PD activity. This is surprising since Postareff et al. (2007) concluded that PD programmes especially impact self-efficacy beliefs of novice teachers. It is important to bear in mind that while a positive impact on self-efficacy was found there is no suggestion of causality.

This study leaves several questions unanswered. Firstly, although English is the lingua franca in academia, it is not the native language of the participants. This may have affected the reflective writing reports and the interviews as participants may not have been able to express their conception as clearly as they might have in Polish. The quality of reports may further be influenced by participants' high workload. Several teachers, regardless of the development type, mentioned that they struggled with completing the PDFT assignments in combination with their workload. Further research is needed to gain a better understanding of the interplay between workload and the development of teaching conceptions. Secondly, the post-survey and the interviews were completed immediately after the PDFT finished. As the effect of the programme might diminish over time (Desimone, 2009), a follow-up study that explores the long-term effect of the PDFT should be considered. Thirdly, although the multidisciplinary nature of the groups was a coincidental result of the voluntarily enrolment, this aspect was mentioned by diverse participants as a contributing factor to their learning. The debate around mono- versus multidisciplinary groups in professional development activities is ongoing (e.g., Ilie et al., 2020). Lastly, we started this study with highlighting the ongoing debate on what the focus of PD programmes should be. The exploratory nature of our study, of which the context was a largely process-focused PD,

prevents us from comparing how different PD programmes affect teachers’ professional learning. Future studies could address this with a (quasi-)experimental design.

Even though it remains unclear why some teachers developed differently than others, it is of great importance to continuously document how individual participants make sense of learning experiences. This provides facilitators insights in teachers’ teaching identity development and in how to guide them in reflection processes. In addition to the reflective writing reports, which were used in the PD programme described in this study, educational developers could think of other reflective practices to record teacher thinking and use these testimonies to enhance reflection; such as portfolios (Steinert et al., 2019) and written or video journals (Frazier & Eick, 2015; Steinert et al., 2019).

**Declaration of Competing Interest**

The authors report no declarations of interest.

**Appendix A**

See Table A1.

**Table A1**  
Coding scheme based on Åkerlind (2003).

	Code	Description
Conception of teaching	Teacher transmission focused	the teacher is imparting information to students, students are passive. The role of the students in the teaching–learning process is largely unconsidered, although it is recognised that material may be easier to absorb if presented in some ways than others. The primary aim of the teacher is to cover material. Teaching as developing good relations with students. Aim = student satisfaction.
	Teacher–student relations focused	Clear focus on the teacher, in terms of what they are doing within this relationship. As a product of the teaching–learning process, the teacher gains a sense of teaching well. Greater focus on the student in terms of what they are doing, rather than the teacher and the students’ reactions to the teacher. The aim is to engage students with the material or subject in order to develop students’ enthusiasm and self-motivation for learning.
	Student engagement focused	The emphasis in this category is on students’ learning and development. The aim is to encourage students to think critically and originally, to question existing knowledge, explore new ideas, see new dimensions and become independent learners. The teacher is seen as gaining both knowledge and enjoyment from the experience of teaching, but also an opportunity to extend their own understanding of the area. Furthermore, they see the potential for broader benefits to the discipline and/or society arising from students’ learning
	Student learning focused	in terms of feeling more confident as a teacher or teaching becoming less effortful
Teaching development	Comfort	in terms of expanding content knowledge and teaching materials, and/or an expanding repertoire of teaching strategies
	Practice	in terms of improving students’ learning and development
	Learning outcomes	

**Appendix B**

See Table B1.

**Table B1**  
Overview of the interview topics.

Interview topic	Exemplary overview of interview questions
Key learning experiences	“What would you say were the key learning experiences for you in the [name PD programme]? Could you draw or visualise them? Feel free to also draw anything or anyone that helped, supported or causes challenges for you in the programme.” “Can you tell me about your visualisation? Why were this key learning experiences for you?” “Is there anything you changed in your teaching or the way you support student learning as a result of the key learning experience? Can you tell me more about this?”
Teaching conceptions	“Why did you change this?”

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