Exploring the Self-Directed Professional Development Process of Secondary Education Teachers in the Context of Educational Change

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July 8, 2022

Abstract

Purpose. This study aimed to explore the self-directed teacher professional development process of secondary education teachers in the context of educational change. Previous studies into self-directed teacher learning describe what, how and why teachers want to learn and present conditions and benefits. To these findings, the present study adds an understanding of the process of self-directed teacher learning by answering the research question: How do teachers in secondary education go through a self-directed professional development process?

Method. A total of 398 teachers in three secondary schools that were involved in an educational change trajectory were invited to report their self-directed learning process. Participants formulated their learning goals and planned learning activities in the first questionnaire. Performed activities and generated learning outcomes were reported in the second questionnaire. The two questionnaires were separated by a timespan of three to five weeks. The first questionnaire was completed by 79 respondents and the second questionnaire by 19 respondents.

Results. The results showed that the self-directed learning teachers primarily formulate learning goals aimed at the development of teaching practices, plan other activities than they perform, plan and perform multiple activities of one or two types, and generate cognitive outcomes only of which most are focused on teaching practices.

Discussion. It is concluded that self-directed learning teachers naturally aim to change their teaching practices. Future research should investigate if the natural focus of self-directed teacher learning on teaching practices leads to the actual change of practices. It is proposed that diaries can be used for this evaluation as measurement methods and for the facilitation of self-directed teacher learning as learning instruments.

Keywords: Educational Change, Teacher Professional Development, Self-Directed Learning.

Acknowledgements

First and foremost, I would like to thank my first supervisor, Dr Mireille Hubers, for her clear guidance and constructive feedback leading towards the completion of this thesis. Secondly, I would like to thank my second supervisor, Nick Goossen, for his support and feedback during this process. Thirdly, I would like to thank all teachers that have provided an insight into their personal learning processes as participants of this study. Last but not least, I would like to thank my family and friends for keeping me motivated with their unconditional support.

Table of Contents

Exploring the Self-Directed Professional Development Process of Secondary Education Teachers in the Context of Educational Change

Educational organisations are on a constant strive to implement educational changes in order to cope with ongoing societal changes like increased globalisation and technological developments (Beycioglu & Kondakci, 2020; Burner, 2018; Ellsworth, 2000). The introduction of the 21st century skills is a recent example of such an educational change. The 21st century skills are knowledge and competences that enable learners to adapt to the rapidly changing environment in the 21st century (Ananiadou & Claro, 2009). For teachers to incorporate these 21st century skills or other educational developments in their educational program, they have to develop the required teacher knowledge, skills and attitudes (Kereluik et al., 2013; Saavedra & Opfer, 2012).

It has been found that teachers' professional development (TPD) can be facilitated and strongly affected by staff development programs (Guskey, 1985). Since then, TPD programs have been used as systematic efforts to bring about educational changes through teacher change (Guskey, 2002). The traditional TPD programs that emerged from Guskey's findings consisted out of pre-defined learning goals (Borko et al., 2010), which have proven to weaken learning motivation (Ryan & Deci, 2000) and are not in line with the problems individual teachers experience in their daily teaching practice (van Veen et al., 2012). Also, these programs facilitated separate passive learning activities focused on the transmission of knowledge about teaching skills to be used in practice (Girvan et al., 2016; Putnam & Borko, 2000; van Veen et al., 2012), whilst it has been found that teachers develop knowledge about teaching and teaching skills by actively participating in the practice of teaching (Adler, 2000). As a learning outcome, these separate passive activities often only generated knowledge about teaching skills (Stein et al., 1999), whilst TPD should primarily change actual teaching behaviour in order to implement educational changes (Bakkenes et al., 2010; Guskey, 1985).

Educational researchers have been studying the effectiveness of different types of TPD programs and identified features of effective TPD programs. It has been found that TPD programs should (1) make teachers set self-initiated learning goals (Louws et al., 2017; Ryan & Deci, 2000; Slavit & Roth McDuffie, 2013; Wagner, 2011) and (2) engage in multiple collective, reflective and active learning activities over a longer period of time (Darling-Hammond et al., 2017; Desimone, 2009; van Veen et al., 2012) to (3) generate changes in teacher knowledge, skills and attitudes with a constant focus on the improvement of student outcomes (Guskey, 1985; Timperley, 2008).

With teachers setting self-initiated learning goals and engaging in multiple collective, reflective and active learning activities, modern TPD no longer only includes separate formal learning activities but also includes informal self-initiated learning activities teachers engage in at self-initiated moments (Desimone, 2009; Kwakman, 2003; Van Eekelen et al., 2005; Wermke, 2011). This makes teacher learning move towards a more self-directed approach (Endedijk et al., 2012; Mezirow, 1985, as cited in Manning, 2007; Van Eekelen et al., 2005). This shift to self-directed learning has been observed by researchers in general adult workplace learning theory as well (Mezirow, 1985, as cited in Manning, 2007).This shift is beneficial because a higher level of developed self-regulatory learning skills among teachers positively affects the ongoing development of education (Timperley, 2008). Also, changes of teaching practices are required to implement changes in education (Guskey, 1985; Timperley, 2008) and research points in the direction that self-directed teacher learning brings about more changes in actual teaching practices (Endedijk, 2010; Porter & Freeman, 2020) than other learning activities (Bakkenes et al., 2010; Doppenberg et al., 2012; Zwart et al., 2008).

Previous studies into self-directed TPD in secondary education present what, how and why self-directed learning teachers want to learn (Louws et al., 2017), describe conditions for self-directed TPD and benefits for effective TPD (Slavit & Roth McDuffie, 2013). However, a general understanding of the learning process has not been mapped out yet. Therefore, the present study explores the self-directed TPD process of teachers in secondary education by answering the question: How do teachers in secondary education go through a self-directed professional development process? To do so, participants will be asked to make reports about the three steps in the self-directed TPD process by formulating learning goals, reporting planned and performed learning activities, and describing learning outcomes.

Theoretical Framework

Traditional TPD

Teacher Professional Development (TPD) was traditionally organised in pre-defined programs and was not self-directed. However, learning goals were set and teachers did engage in activities that created certain outcomes. Teachers' learning goals traditionally emerged from the findings that organisational changes in education can be established through teacher learning (Fullan, 2014; Guskey, 1985; Little, 1993; Vandenberghe, 1984). This made program designers prescribe learning goals to ensure that their TPD program would lead to the desired changes (Borko et al., 2010). The content of these learning goals was primarily focused on the transmission of knowledge about teaching skills to be used in practice (Girvan et al., 2016; Guskey, 1985). To attain their learning goals, teachers engaged in separate formal learning activities external from the actual classroom context such as workshops and lectures (Borko et al., 2010; van Veen et al., 2012). During these activities, teachers acted as individual passive learners (Girvan et al., 2016; van Veen et al., 2012) and were supposed to apply the presented information to their personal teaching context (Girvan et al., 2016; Guskey, 1985). However, this last step of application was not supported and has been reported as problematic for the teachers (Stein et al., 1999). The teacher learning outcomes that program designers aimed to establish in the first place were knowledge about teaching skills and the use of these skills in practice. This would change student outcomes, which would result in the third teacher learning outcome: changed teachers' beliefs and attitudes about teaching (Guskey, 1985). Because transferring the presented knowledge about teaching skills into the actual use of these skills in practice was problematic for teachers, often only the first outcome, acquisition of knowledge about teaching skills, was obtained through traditional TPD programs (Stein et al., 1999). In a more recent study, Bakkenes et al. (2010) followed teachers in a TPD program focused on educational changes and reported that 50% of the teachers' learning outcomes were changes in teachers' knowledge and only 1.4% were actual changes in teaching practices.

The Ideal TPD Process

The traditional combination of imposed goals, passive activities and cognitive outcomes is not ideal for effective TPD. In the first place, because imposed goals decrease an important predictor for learning and development: learners' intrinsic motivation to learn (Ryan & Deci, 2000). Instead, self-initiated learning goals should be stated at the start of a

learning program to boost learning motivation (Ryan & Deci, 2000) and engagement (Slavit & Roth McDuffie, 2013; Wagner, 2011). Additionally, setting self-initiated learning goals aids in the effectiveness of TPD because this enables teachers to self-identify their learning needs and set goals that align with the problems they experience in their daily teaching experience (Slavit & Roth McDuffie, 2013; van Veen et al., 2012).

Regarding the learning activities, effective TPD should include collective learning activities in which teachers collaborate to learn with each other (Darling-Hammond et al., 2017; Desimone, 2009). Moreover, in the study of Zhou et al. (2021) collective learning was most popular and primarily caused changes in the craft of teaching with the outcome 'occupational knowledge and skills'. Secondly, effective TPD should build in reflective learning activities to develop teaching practice (Darling-Hammond et al., 2017). Moreover, most of the teachers in the study of Bakkenes et al. (2010) that reported to have changed their teaching practices engaged in the reflective activity 'considering own practice'. Thirdly, teachers develop their knowledge about teaching and teaching skills by actively participating in the actual practice of teaching (Adler, 2000). This calls for active learning activities within the classroom context, instead of the traditional passive learning activities outside of the classroom (Borko et al., 2010; Darling-Hammond et al., 2017; van Veen et al., 2012). Moreover, teachers in the study of Endedijk (2010) did change their teaching practice which was mainly caused by the active learning activity 'learning by doing'. Lastly, researchers commonly conclude that, contrary to the one-shot activities in traditional programs, participation in multiple learning activities over a longer period of time will aid to the effectiveness of a TPD program (Darling-Hammond et al., 2017; Desimone, 2009; van Veen et al., 2012). In sum, effective TPD facilitates multiple collective, reflective and active learning activities over a longer period of time.

Regarding the learning outcomes, the traditional programs generate outcomes that are incomplete as research shows that teachers primarily develop cognitively (Bakkenes et al., 2010). This is problematic because change in education requires changes in both thoughts and behaviours of individual teachers (Vandenberghe, 1984). To be complete, a TPD program should generate outcomes in teachers' knowledge, skills, and attitudes (Guskey, 1985). Knowledge refers to retrieving information about teaching practices, skills refer to learning how to use new teaching practices, and attitudes refer to a change in beliefs and attitudes towards teaching practices and teaching in general. In addition to teacher learning outcomes, TPD should be focused on the improvement of student outcomes as well because a teacher's final responsibility is the learning of students (Timperley, 2008). This means TPD can be

considered successful if the teacher learning outcomes positively affect student learning outcomes.

The recommendations for teacher learning goals, activities and outcomes described above can be summarised in an ideal TPD process that consists of three stages: (1) setting self-initiated learning goals; (2) engaging in multiple collective, reflective and active learning activities over a longer period of time; and (3) establishing changes in teachers' knowledge, skills and attitudes with a constant focus on the improvement of students' learning outcomes. These stages can be facilitated in a self-directed TPD process.

Self-Directed TPD

Self-Directed Learning Goals

The self-directed teacher learning process starts with teachers setting self-initiated learning goals because when doing so, learners show higher levels of learning motivation (Ryan & Deci, 2000) and engagement (Slavit & Roth McDuffie, 2013; Wagner, 2011). Motivation and engagement are primarily boosted because teachers decide on the content of their goals themselves which ensures that teachers self-identify their learning needs and set goals that align with the problems teachers experience in their daily teaching experience (Slavit & Roth McDuffie, 2013; van Veen et al., 2012). The type of learning goals teachers set can be categorised by their content and depth.

Content of goals. Regarding the content of teachers' learning goals, Shulman (1986) identified three categories of secondary education teachers' knowledge: (1) subject matter content knowledge, which is the knowledge about the subject taught by the teacher, (2) pedagogical content knowledge, which refers to knowing how to educate students using the subject content knowledge, and (3) curricular knowledge, which refers to knowing how the students' curriculum is organised. Regarding these categories, Shulman (1986) states that TPD has always had a great emphasis on the development of teacher's skills, rather than the development of teacher's knowledge, which points out that teachers have been primarily setting goals of pedagogical content knowledge.

Depth of goals. Learning goals can also be categorised by their depth. Bloom's taxonomy for educational objectives, first published in 1956 and revised by Anderson et al. in 2001, categorised the depth of a learning goal based on the depth of addressed cognitive process and addressed knowledge. First, six levels of cognition are described: (1) remember, to recognize or recall information. (2) Understand, to interpret or explain the meaning of instructional messages. (3) Apply, to execute and implement a procedure in a given situation. (4) Analyse, to process information by breaking it into separate parts and determine how these parts relate. (5) Evaluate, to check and formulate critique based on criteria. (6) Create, to produce a coherent whole or original product by putting elements together. Webb (1999) categorised the depth of learning goals by types of knowledge in the Depth of Knowledge (DoK) theory. He states that teachers can set goals in four levels of knowledge. In their revised version of Bloom's taxonomy, Anderson et al. (2001) added the knowledge dimension to the existing dimension of cognitive processes. This knowledge dimension consisted out of four types of knowledge: factual knowledge, conceptual knowledge, procedural knowledge, and meta-cognitive knowledge. Factual knowledge is defined as knowledge of specific details

and elements, or ‘bits of information’. Conceptual knowledge is defined as more complex and organized forms of knowledge such as classifications and theories. Procedural knowledge is defined as knowledge of how and when to execute certain skills and techniques. Meta-cognitive knowledge is the highest form of knowledge and is defined as knowledge about cognition, including one’s own internal processes. To display the depth of a learning objective, Anderson et al. combined the cognitive process dimension and knowledge dimension in a two-dimensional table with the cognitive process dimension on the x-axis and the knowledge dimension on the y-axis. Placing teachers’ learning goals in this two-dimensional table, teachers will primarily set goals at the level of apply and create on the y-axis and procedural knowledge on the x-axis, because TPD emphasises the development of teacher’s skills (Shulman, 1986) and because the educational change requires change of teacher’s practice (Guskey, 1985; Timperley, 2008).

Setting well-defined learning goals is an important step of the teacher learning process (Endedijk, 2010). The interpretation of the learning goals set in this study will create a broader understanding of the type of learning goals of secondary education teachers in the context of an educational change trajectory. To interpret the learning goals set by teachers in this study, their content will be determined using Shulman’s categorisation. Subsequently, the depth of the goals will be determined using the cognitive process dimension and the knowledge dimension described in the revised version of Bloom’s taxonomy by Anderson et al. (2001). It could be argued that Shulman’s categorisation repeats the knowledge dimension in Bloom’s taxonomy because at a first glance the categories might seem to relate. For example, pedagogical content knowledge, which is knowledge about teaching procedures, seems to always be at the depth of procedural knowledge. However, one can also set a learning goal of pedagogical content knowledge at the depth of factual knowledge, which would indicate that one aims to collect factual information about pedagogical teaching behaviours.

Self-Directed Learning Activities

To attain their learning goals, teachers engage in learning activities. Several researchers have studied the learning behaviour of teachers and comprised lists of teacher learning activities. Van Eekelen et al. (2005) studied 86 self-reported learning experiences of 15 higher education teachers across three different institutes involved in change trajectories and identified four categories of teacher learning activities. Bakkenes et al. (2010) studied 735 reports of 94 teachers across 30 schools involved in an educational change trajectory. From

this study, six categories of teacher learning activities were identified. Endedijk (2010) studied 133 reports from 28 student teachers in the context of self-directed teacher learning and identified five learning activities: learning by doing, learning by processing information, learning by interacting or getting feedback, learning by applying theory to practice, and learning by reflection or evaluation. The present study will use the latter-mentioned categorisation because although all three lists are indicators of what the self-directed TPD process might look like, Van Eekelen et al. (2005) and Bakkenes et al. (2010) do not provide a realistic image of this process. First, Van Eekelen et al. (2005) state that the small number of reported learning experiences, using self-reported data, and not using observational data in their study, make it difficult to generalize their results. Second, although Bakkenes et al. base their conclusions on a vast number of participants, their study was not primarily focused on the self-directed TPD process, but studied teacher learning in the context of peer-coaching, collaborative learning and informal learning activities. The conclusions of Endedijk (2010) are based on a significant amount of 133 reports of 28 teachers with a full focus on the self-directed TPD process.

Endedijk's categorisation will be evaluated in two ways. Firstly, it should be mentioned that Endedijk studied student teachers. The present study will evaluate if working teachers report the same learning activities as student teachers. Secondly, teachers ideally engage in multiple collective, reflective and active learning activities over a longer period of time. The present study will use Endedijk's categorisation to evaluate if self-directed learning teachers report the ideal combination of learning activities. The learning activities described by Endedijk (2010) can be accommodated to these three ideal types of learning activities as follows:

Collective learning. 'Learning by interacting or getting feedback' includes reports of teachers getting direct feedback and information from others or teachers observing other teachers. This is considered collective learning because teachers learn from each other.

Reflective learning. 'Reflection or evaluation' is self-evidently considered reflective learning. It was reported in combination with all other learning activities and refers to the evaluation of a teaching experience.

Active learning. 'Learning by doing' was reported most and refers to trying new things in practice. 'Learning by applying theory to practice' refers to using a learning theory in practice after the explanation of a teacher educator or other professional. Teachers who reported these activities were involved in active learning because they learned by actively participating in the actual practice of teaching (Adler, 2000).

Other. ‘Learning by processing information’ was reported by teachers who read or listened to information and cannot be reported to active, reflective or collective learning.

Self-Directed Learning Outcomes

Teachers’ learning activities have shown to be significantly related to the learning outcomes they generate (Bakkenes et al., 2010; Zhou et al., 2021; Zwart et al., 2008). Several researchers have comprised lists of teacher learning outcomes. Zwart et al. (2008) studied eight high school teachers from four schools in the Netherlands and identified seven categories of learning outcomes. Bakkenes et al. (2010) studied the learning process of 94 experienced high school teachers in 30 schools in The Netherlands and identified four categories of learning outcomes. Doppenberg et al. (2012) studied 14 teachers and seven principals from seven Dutch primary schools and identified five types of individual teacher learning outcomes. Endedijk (2010) studied 133 reports from 28 student teachers and identified seven learning outcomes in an open question learning report: specific teaching practice, knowing why, knowing that, knowing how, knowing about myself, description of an experience, and rule of thumb.

The present study will use the latter-mentioned categorisation of teacher learning outcomes to identify the learning outcomes of the participants because Endedijk studied TPD in the context of self-directed teacher learning. The outcomes in Zwart et al. (2008) come from peer-coaching activities, in Doppenberg et al. (2012) from collaborative learning activities and in Bakkenes et al. (2010) from peer-coaching, collaborative learning and informal learning activities. With the knowledge that teacher learning outcomes are significantly related to the learning activities teachers engage in (Bakkenes et al., 2010; Zwart et al., 2008), the outcomes presented in Endedijk (2010) are most likely to match the outcomes teachers will obtain from the self-directed learning process during this study.

The outcomes reported in Zwart et al. (2008), Doppenberg et al. (2012) and Bakkenes et al. (2010) show that other teacher learning trajectories mainly caused cognitive outcomes. Changes in teaching practices were hardly reported in these studies. Zwart et al. (2008) observed the intention to change behaviour being reported in only 9.4% of the outcomes, in Bakkenes et al. (2012) the actual permanent change of teaching practice was reported in only 1.4%, and in Doppenberg et al. (2012) not a single outcome related to teaching practice was reported. Looking at the reports in Endedijk (2010), teachers primarily describe changes in specific teaching practices with a significant amount of cognitive outcomes. This is beneficial

because TPD originally aims to make change in education by developing both teachers' cognition and practice (Vandenberghe, 1984).

The present study will evaluate Endedijk's categorisation in two ways. First, it will be evaluated if Endedijk's findings stating that student teachers report changes of practice as their main outcome apply to working teachers in secondary education as well. Second, TPD ideally brings about changes in teachers' knowledge, attitudes, and teaching skills (Guskey, 1985). The present study will use the outcomes reported in Endedijk (2010) to determine if the desired outcomes are generated by the self-directed TPD process. The categorisation of Endedijk can be accommodated to the three categories of ideal learning outcomes as follows:

Knowledge. This category refers to retrieving information about teaching practices (Guskey, 1985). Teachers in Endedijk (2010) reported several outcomes in knowledge. 'Knowing why' includes the recognition of when, why and under what circumstances a certain teaching approach should be used. 'Knowing that', refers to the acquisition of new factual information. 'Knowing how' refers to having knowledge about a certain teaching behaviour. 'Rule of thumb' refers to the obtained knowledge of strict rules that should always be followed.

Skills. This category refers to learning how to use new teaching practices (Guskey, 1985). Endedijk (2010) reports that teachers primarily reported outcomes in this category by reporting to have learned a 'specific teaching practice', which refers to learning how to use a specific teaching behaviour.

Attitudes. This category refers to a change in beliefs and attitudes towards teaching practices and teaching in general (Guskey, 1985). Teachers in Endedijk (2010) have reported outcomes in attitudes towards teaching with the category 'knowing about myself', which includes changes in a teacher's identity and the awareness of one's own learning processes. Change of identity and awareness of teachers cause them to reconsider their attitudes and beliefs towards teaching practices and teaching in general.

No learning outcome. Some teachers reported no learning outcome but a 'description of an experience', which refers to descriptions of learning experiences without stating a specific learning outcome.

Synthesising, the self-directed TPD process starts with teachers setting self-initiated learning goals. These goals are directly related to the learning activities teachers subsequently engage in. Regarding the traditional externally regulated TPD programs, Cwikla (2002) states that explicit and well-defined learning goals enable TPD program designers to facilitate learning activities that aid to achieving teachers' learning goals. In modern TPD this relation is even stronger, as Slavit & Roth McDuffie (2013) report how self-directed learning teachers develop by setting up a plan for learning activities according to their learning needs. Despite these plans, Van Eekelen et al. (2005) observed that only one-third of teacher learning experiences was planned and that unplanned learning experiences constantly occur in the practice of teaching. Therefore, Endedijk (2010) states that learning teachers should be equipped with the skill of setting clear learning goals to consciously choose learning activities in practice to reach these goals. This will make teachers go through a planned learning experience instead of their development depending on what learning experiences teachers coincidentally engage in during practice.

The learning activities teachers engage in have shown to be significantly related to the learning outcomes they lead to (Zhou et al., 2021; Zwart et al., 2008). The present study is focused on the facilitation of self-directed TPD to implement educational changes. Based on the finding that change in education requires change in the teaching practices of individual teachers (Guskey, 1985; Timperley, 2008), it is desired to generate changes in teaching practices as the main learning outcome. In the context of self-directed student teacher learning, Endedijk (2010) reports the active learning activity 'learning by doing' as the main teacher learning activity and 'specific teaching practice' as the main outcome. Although no specific relationship has been explicitly tested by Endedijk, it can be carefully stated that self-directed learners choose active learning activities and therefore report change in their 'specific teaching practices'. Bakkenes et al. (2010) did explicitly test the association between teacher learning activities and outcomes in other learning contexts of working teachers. They report that the few teachers that did change their teaching practices engaged in the reflective activity 'considering own practice' and the active learning activity 'experimenting'.

A contrast is observed between TPD that followed a scheduled program which primarily produced cognitive outcomes (Bakkenes et al., 2010; Doppenberg et al., 2012; Zwart et al., 2008) versus self-directed TPD processes that primarily produced changes in actual teaching practices (Endedijk, 2010; B. Porter & Freeman, 2020). Because it is desired to generate changes in teaching practices as the main learning outcome in order to implement

change in education (Guskey, 1985; Timperley, 2008), this study will further investigate the self-directed TPD process.

Research questions

The present study aims to explore the self-directed TPD process of teachers in secondary education by answering the main question: *'How do teachers in secondary education go through a self-directed professional development process?'* To answer this main question, four sub-questions are answered. The first three questions specifically conceptualise each step of the TPD process: *'What type of learning goals do teachers set?', 'What type of learning activities do teachers choose?', 'What type of learning outcomes are generated?'* The fourth question conceptualises the relationships between these steps: *'How do teachers' learning goals, activities and outcomes relate?'*

Hypothesises

Hypothesising the answer to the first question, it is expected that the teachers in this study will primarily focus on the development of their teaching practices. In the first place because the present study is conducted in the context of an educational change trajectory that requires changes in the practice of individual teachers (Guskey, 1985; Timperley, 2008). Secondly, because TPD has always had a great emphasis on the development of teacher's skills, rather than the development of teacher's knowledge (Shulman, 1986). Regarding the learning activities, it is hypothesised that the participants will perform the required collective, reflective, and active learning activities. This is expected because of the results in Van Eekelen et al. (2005) and Endedijk (2010), who studied a self-directed TPD process. 'Learning by doing' was reported most in Endedijk (2010), which accounts for the expectation that teachers will engage in active learning activities. 'Learning in interaction' was reported most in Van Eekelen et al. (2005), which accounts for the expected collective learning activities. 'Reflection or evaluation' was reported in combination with all learning activities in Endedijk (2010), which accounts for the expectation of reflective learning activities. Regarding the learning outcomes, it is hypothesised that teachers learning in a self-directed context will report the required changes in knowledge, skills, and attitudes with a focus on teaching practices. This expectation is based on the learning outcomes reported in other contexts of self-directed teacher learning. Endedijk (2010) concludes that the self-directed learning process of student teachers primarily generated outcomes in practice with a significant amount of cognitive outcomes. More recently, Porter & Freeman (2020) report a focus on changes in teaching practice as a result of self-directed teacher learning in religious education.

Relevance

Scientifically speaking, the findings in this study will contribute to the research field of TPD. Previous studies into self-directed TPD in secondary education present what, how and why self-directed learning teachers want to learn (Louws et al., 2017), and describe conditions for self-directed TPD and benefits for effective TPD (Slavit & Roth McDuffie, 2013). However, a general understanding of the learning process has not been mapped out yet. Therefore, the present study will explore the full self-directed TPD process. Next to pointing out the separate steps in this learning process, the present study contributes to the understanding of the relations between these steps. Previous studies found that the type of teachers' learning goals predict the type of learning activities they engage in (Hirst et al., 2009; C. O. L. H. Porter, 2005; Shirazi et al., 2014; Vandewalle, 1997) and that teachers' learning activities are significantly related to the learning outcomes they lead to (Bakkenes et al., 2010; Zhou et al., 2021; Zwart et al., 2008).

On a practical note, the whole educational field will profit from a broader understanding of self-directed TPD. Education is constantly trying to cope with ongoing societal changes by implementing educational changes (Beycioglu & Kondakci, 2020; Burner, 2018; Ellsworth, 2000). Because high levels of self-regulatory teacher learning enables TPD to become an ongoing process of educational development (Timperley, 2008), findings in the present study will contribute to the facilitation of ongoing professional development in education. When constantly ongoing professional development can be realised, education might be able to keep up with changes in society.

Method

Context

This study was conducted in three secondary schools in The Netherlands involved in an educational change trajectory guided by the University of Twente. The schools were guided by an educational change program that aimed to create sustainable changes in educational organisations through the professional development of teachers. As part of the change trajectory, all teachers of the three schools were invited to provide reports of their self-directed learning process for the present study.

Design

The present study followed an explorative research design to set the first steps in understanding the self-directed TPD process. Explorative studies are performed when researchers have a reason to believe something is worth discovering (Stebbins, 2001). In this case, researchers have a reason to believe that it is worth discovering the process of self-directed teacher learning because previous studies have shown benefits and potentials of self-directed teacher learning (Endedijk, 2010; Louws et al., 2017; B. Porter & Freeman, 2020; Slavit & Roth McDuffie, 2013).

Participants

From the teachers in the three schools involved in this study, a voluntary response sample was retrieved. This sampling method is beneficial because volunteers will provide high quality and reliable data which is beneficial for the collection of descriptive data (Murairwa, 2015). Out of 124 approached teachers in one school, 34 teachers filled in the first questionnaire and 5 teachers responded to the second questionnaire. Out of 107 approached teachers in the other school, 28 teachers filled in the first questionnaire and 5 teachers responded to the second. Out of 167 approached teachers in the third school, 17 teachers completed the first questionnaire and four teachers responded to the second. A total of 398 teachers in three secondary schools were approached to participate of which 79 teachers engaged in the present study. No personal background information of the participants was available.

Instrumentation

Two digital questionnaires were used as the main instruments of this study which were sent by email. In the first questionnaire, respondents formulated their learning goals in an open-ended item and planned learning activities in a multiple-choice item in which teachers chose from eight possible activities in line with the learning activities described by Endedijk (2010). Teachers were able to indicate other learning activities in an open-ended item. Additionally, teachers that did not want to set a learning goal were provided the opportunity to explain why.

In the second questionnaire, participants reported their performed learning activities in the same closed and open-ended items as in the first questionnaire. Subsequently, teachers reported their learning outcomes by answering the open-ended question: "What did you learn from this?" Additionally, participants that did not work on their learning goal were provided the opportunity to explain why.

Procedure

All teachers of the three schools involved in the change trajectory received the first questionnaire via email, which started with an active informed consent letter explaining the purpose and procedure of the study, assuring its confidentiality and letting teachers indicate their voluntary participation. Three weeks later, the volunteers received the second questionnaire. Both questionnaires had to be filled in within two weeks, so development periods of three to five weeks were studied. To finalise the study, the participants were thanked for their participation and informed about the contact details of the researcher to enable them to share further questions or thoughts about the study.

Data analysis

The questionnaires produced data of both qualitative and quantitative nature. The qualitative data regarding teachers' learning goals, outcomes, and reasons for dropping out of the study were coded into quantitative data using five codebooks created by the researcher. The interrater reliability (IRR) of the codebooks was tested by computing Cohen's Kappa based on 50% of the data. First, a deductive codebook was created to determine the content of a learning goal based on Shulman (1986), which showed a substantial IRR with a Kappa value of .827 with $p \leq .05$. Second, two deductive codebooks were created to determine the depth of addressed knowledge and cognition of a learning goal based on the revised version of

Bloom's Taxonomy by Anderson et al. (2001), which both showed a substantial IRR with a Kappa value of .848 with $p \leq .05$. The first three codebooks can be found in Appendix A. Third, a deductive codebook was created to code the teachers' learning outcomes reported in the second questionnaire based on Endedijk (2010), which showed a substantial IRR with a Kappa value of 1.000 with $p \leq .05$. This codebook can be found in Appendix B. Finally, an inductive codebook was created to categorise the reasons for teachers to drop out of the study reported in both questionnaires, which showed a substantial IRR with a Kappa value of 1.000 with $p \leq .05$ and can be found in Appendix C.

To answer the main research question, this study will analyse what type of learning goals, activities and outcomes teachers report and how they relate. Among the learning goals categorised in the three codebooks described above, a trivariate crosstabulation will provide an overview of the distribution of the learning goals and a content analysis will point out similarities and differences between the learning goals. The planned and performed learning activities will be compared by creating two multiple response sets of which descriptive statistics will be retrieved. The reported activities will be assigned to the categories of collective, reflective, and active learning activities. From the coded learning outcomes the descriptive statistics will be retrieved and each report will be assigned to the categories of knowledge, skills, and attitudes. A content analysis will point out similarities and differences between the learning outcomes. To determine relations between the three steps of the learning process, data from participants that completed the full study will be analysed. A visualisation in a Sankey diagram and a content analysis of individual teachers' learning processes will clarify patterns in self-directed TPD. Additionally, from the coded reports of reasons for teachers to drop out of the learning process the descriptive statistics will be retrieved.

Results

This results section answers the four sub-questions. Firstly, the content and depth of the learning goals is discussed. Additionally, similarities and differences between the learning goals are presented. Secondly, the planned and performed learning activities are presented and accommodated to the categories collective, reflective and active learning activities. Subsequently, differences between the planned and performed activities are discussed. Thirdly, the reported learning outcomes are presented and accommodated to the categories of knowledge, skills, and attitudes. Lastly, seven learning processes of teachers that completed the full study are visualised in a Sankey diagram and patterns are discussed to determine relations between learning goals and learning outcomes, learning goals and learning activities, and learning activities and learning outcomes.

Learning Goals

Content and Depth

The first research question this study aimed to answer was 'What type of learning goals do teachers set?' A total of 34 learning goals were reported and deductively coded in three categorisations: content of the learning goal, addressed depth of knowledge, and addressed depth of cognition. Regarding the first categorisation, most goals (82.4%) related to pedagogical content knowledge. Teachers that had set this type of goal wanted to learn about how to educate, for example: *'Learn about other ways of presenting and practising'.* The other six teachers (17.6%) set a goal of curricular knowledge. Regarding the second categorisation, most teachers (79.4%) set a learning goal at the level of procedural knowledge. Goals on this level are focused on the development of certain teaching practices, for example: *'I want to provide even more education with choices and differentiation'*. From the remaining seven goals, four were set at the level of conceptual knowledge, two at the level of factual knowledge, and one at the level of meta-cognitive knowledge. In the third categorisation, the majority of the goals (70.6%) were set at the application level. At this level, the learner is focused on the execution and implementation of teaching practices, for example: *'Provide the opportunity for students to work in different levels within the practical subject*'. From the remaining ten goals, six were set at the level of understanding, three at the level of analysing, and one at the level of evaluating. A trivariate crosstabulation among the content of the learning goal, depth of knowledge and depth of cognition showed that 21 out of all 34 goals (61.8%) are a combination of pedagogical content knowledge, at the depths of procedural

knowledge and apply. These goals were focused on learning how to educate by developing and applying teaching practices.

In the content analysis, it was observed that for a learning goal to be focused on teaching practices it does not necessarily have to be assigned to pedagogical content knowledge, the depth of procedural knowledge and the depth of apply. For example, the goal: *'Devote time to English culture once in every lesson'* describes how a teacher planned to adjust the curriculum and therefore accommodates to curricular knowledge instead of pedagogical content knowledge. But it is focused on a teaching practice, because it also belongs to the depths of procedural knowledge and application, as it describes how a teacher wishes to apply a certain teaching procedure in practice. As another example, the goal: *'How can I use formative testing in the art subjects?'* is of pedagogical content knowledge at the depth of procedural knowledge as this teacher indicates to be interested in the implementation of a teaching procedure. However, the goal is not set on the application level but at the level of understanding. This teacher does not aim to use formative tests yet, but instead aims to gain knowledge about how to do so. It was observed that learning goals were focused on a teaching practice if they could be assigned to one or more of the three categories: pedagogical content knowledge, procedural knowledge or apply. Following this line of reasoning, it is concluded that 31 learning goals were focused at teaching practices. Because 21 goals were accommodated to pedagogical content knowledge at the level of procedural knowledge and the level of application and 10 goals were accommodated to one or two of these categories.

Development of Teaching Practices

To continue the content analysis among the 31 learning goals that focused on a teaching practice, each of these goals was labelled with what teaching practice it was aimed at. This resulted in a total of five categories of teaching practices: differentiation, communication, feedback, monitoring, guidance, and other specific skills.

Differentiation. Most learning goals, 18 of them, were aimed at the development of the ability to differentiate between the levels of students. Some teachers very specifically stated what actions they wished to develop in the context of differentiation: *'Provide additional help and instruction to the students that need this'* or *'Learn about other ways of presenting and practising'*. In these examples, teachers specifically aimed to develop in providing differentiated help, instruction, presentations, and practices. Other teachers more generally described what they wished to develop in differentiation, but did not state what specific skills they wished to develop in this context: *'I want to provide even more education*

with choices and differentiation' or *'How to cope with the concept that every student is different'*.

Communication. Four teachers wanted to develop their communicational skills in three sub-categories. Firstly, two teachers wanted to develop their communication with students: *'Provide good information about forms of art in the moments of counselling'* and *'Communicate better towards students concerning projects'*. Secondly, one teacher wanted to develop communication with colleagues*: 'Raise awareness for this topic in every meeting with teachers'*. Thirdly, a teacher wanted to develop its communication towards public relations: *'Let cultural profiling stand out clearly in the communication about our school.'*

Feedback. Two teachers aimed to develop in providing feedback. One of them in the context of an online system: *'Provide all students in my vwo4 class with good feedback through an online system for individual feedback'*. The second teacher wanted to provide feedback in the context of formative tests: *'check these exercises and formulate feedback'*.

Monitoring. Two teachers wanted to develop their monitoring skills. One of them focused on monitoring students: *'Monitor the emotional wellbeing of students regarding the COVID regulations'*. The other focused on monitoring a certain phenomenon: *'Monitor to what extent I will be confronted with the concept that every student is different'*.

Guidance. Two teachers aimed to develop their ability to guide a particular learning process of their students. One teacher focused on guiding a making process and reports: *'Guiding students through the steps of a making process'.* The other teacher focused on guiding a reflection process and reports: *'Make sure students reflect on their produced work and that they make conscious decisions in this process.'*

Other specific skills. To form the last category, three teachers reported other specific teaching strategies they wished to develop. One teacher described a particular administrative practice: *'Finalize the Program of Assessment and Completion of all classes'*. Another teacher reported the need for sharing a very specific fact: *'Make students understand that the founding of monuments is a way in which a culture accounts for its past and that how this is done is subject to change.'* A third teacher wished to devote more time to a particular topic: *'Devote time to English culture once in every lesson.'*

Next to the conclusion that most learning goals were focused on teaching practices. The results above show that most of these goals were focused on differentiation practices, followed by practices considering communication, other specific skills, feedback, monitoring and guidance.

Discrepancies among Learning Goals

The main observed difference between all learning goals was if a goal aimed to develop a teaching practice or not. As discussed above, 31 goals were aimed at the development of teaching practices and three goals had another focus. One of these goals was aimed at gaining knowledge about tools that could be used to improve the curriculum: *'I want to orient myself on the required tools to create online course material myself'*. The other two goals were aimed at developing an understanding of a curricular concept: *'Gain insight into what cultural profiling entails'* and *'Wait to see what is meant with customised work'*.

The 31 learning goals commonly aimed at the development of a particular teaching practice differ from each other as well. In the first place, these goals can be divided into the five categories of teaching practices as described above. A second difference is if the practice is used inside the classroom and directed toward students or not. 28 goals describe a teaching practice inside the classroom. For example: *'Provide more education with choice and differentiation.'* This goal describes a teaching practice that will be noticed by students inside the classroom. Three goals are not noticeable inside the classroom or directed towards students: *'Raise awareness for this topic in every meeting with teachers'*, *'Let cultural profiling stand out clearly in the communication about our school'*, and *'Finalize the Program of Assessment and Completion of all classes'*. The practices described in these goals occur out of the classroom and were directed at colleagues or public relations. Another difference is which people the teacher expected to affect. 30 learning goals address a larger group of people. These goals address students in general: *'allow students to work at different levels'*, a particular group of students: *'in group 4M, 4V and 5V I want to…'*, address teachers: *'… in every meeting with teachers'*, or address public relations: *'… in the communication about our school'*. One goal was aimed at an individual student: *'I want to learn to gain insight into the particular needs of one specific student.'*

Learning Goals Summarised

To answer the first research question, teachers primarily set learning goals focused on teaching practices. More specifically, 31 goals were focused on teaching practices and three goals were focused on the acquisition of curricular knowledge. Looking into the qualitative data, the majority of the goals was focused on the development of differentiation practices, are performed inside the classroom, and affect a group of people.

Learning Activities

To answer the second research question: 'What type of learning activities do teachers choose?' the reported planned and performed activities were accommodated to the categories of collective, reflective, and active activities. It was also observed how teachers planned and performed combinations of these three types of activities. Additionally, it is discussed how the planned and performed activities differ from each other.

Planned Activities

Out of the 34 teachers that set a learning goal in the first questionnaire, 26 planned learning activities to perform during this study. Most teachers, 18 out of 26, had planned multiple activities which resulted in a total of 66 planned learning activities. There were 62 learning activities planned in the multiple-choice question and four teachers made qualitative reports of 'other learning activities'. After evaluation of these reports, one was assigned to the category 'asking a colleague for help'. The other three reports collectively formed a new category: 'Learning from external experts', because they each describe how teachers planned to consult an external source of information: *'follow a masterclass', 'consult a friend who is an ICT specialist'* and *'invite experts to the study day of 26-11'*.

Planned collective learning activities. The reports show that most teachers preferred to learn with and from others in collective learning activities because 20 out of the 26 teachers planned at least one collective learning activity and 39 out of the 66 planned activities were collective learning activities. Within these collective learning activities, a distinction between learning partners was observed. Activities involving colleagues as learning partners were reported 18 times. Activities involving students as learning partners were reported 17 times. The activity involving external experts as learning partners was reported three times. Thus, teachers showed to prefer a learning partner inside their school environment with a slight preference for colleagues. Zooming in on this preference, it was observed that seven teachers planned collective learning activities with only colleagues as learning partners and three teachers planned collective learning activities with only students as learning partners. The other seven teachers planned to learn with both their colleagues and their students.

Planned reflective learning activities. Next to collective learning activities, individual learning activities were planned. Reflective learning was planned by 10 teachers in the form of the activity: 'Reflection on earlier relevant gained experiences'. Four of these teachers planned to combine this activity with 'Searching for information in a book or on a

website', which might point out that these teachers planned to use theoretical information to evaluate their teaching practice.

Planned active learning activities. Active learning was planned by seven teachers in the form of the activity: 'Learning by trying out multiple things'. Four out of these teachers combined this with 'Searching for information in a book or on a website', which might point out that these teachers planned to apply theory to their practice.

Planned combinations of collective, reflective, and active learning. Collective, reflective, and active learning activities were combined by 11 out of the 26 teachers. Firstly, two teachers planned a combination of all three types of learning activities. Secondly, it was observed that five teachers planned a combination of collective and reflective learning. Thirdly, four teachers planned a combination of collective and active learning. Lastly, no teachers planned to combine reflective and active learning.

In conclusion, teachers primarily plan collective learning activities with a slight preference for colleagues as their learning partners. Thereafter, teachers mostly plan reflective learning activities followed by active learning activities. Several combinations of different types of learning activities have been observed. A combination of collective, reflective, and active learning activities was planned by two teachers. A total of five teachers planned collective and reflective learning activities, and four teachers planned collective and active learning.

Performed activities

In the second questionnaire, nine teachers reported their performed learning activities. Six out of these teachers performed multiple activities which resulted in a total of 20 performed activities. Again, teachers answered a multiple-choice question and an open-ended question. Five qualitative reports were made of learning activities that could not be assigned to one of the activities in the multiple-choice question. After evaluation of these reports, they were all assigned to one of the existing categories of learning activities: two to 'asking input from students', one to 'asking a colleague for help', one to 'learning by trying out multiple things', and one to 'learning from an external expert'.

Performed collective activities. A total of nine collective learning activities were performed. One activity involving students as learning partners was reported five times, collective activities involving colleagues as learning partners were reported three times, and learning with external experts as learning partners was reported one time. Moreover, all three

activities involving colleagues were reported by one teacher. It is concluded that teachers mostly perform collective learning activities with students

Performed reflective learning activities. Reflective learning was reported six times and with that, the activity 'Reflection on earlier relevant gained experiences' accounted for 30% of all learning activities. Reflection was in one case combined with 'Searching for information in a book or on a website'.

Performed active learning activities. Active learning was reported three times and with that, the activity 'Learning by trying out multiple things' accounted for 15% of the performed activities. 'Searching for information in a book or on a website' was not reported as a performed activity, so none of the teachers applied theory to practice.

Performed combinations of collective, reflective and active learning. Among the teachers that reported their performed activities, four teachers report combinations of collective, reflective, and active learning activities, four teachers performed only one of these types of activities and one teacher reported to have only performed 'searching for information'. Firstly, two teachers performed a combination of all three types of learning activities. Secondly, it was observed that one teacher performed a combination of collective and reflective learning. Thirdly, one teacher performed a combination of reflective and active learning. Lastly, no teachers planned to combine collective and active learning.

In conclusion, teachers primarily perform collective learning activities with students as their learning partners. Thereafter, teachers mostly perform reflective learning activities, followed by active learning activities. Several combinations of different types of performed learning activities have been observed. A combination of collective, reflective, and active learning activities was performed by two teachers, collective and reflective learning was combined by one teacher, and reflective and active learning was combined by one teacher.

Comparing Planned and Performed Activities

It has been found that teachers both planned and performed multiple learning activities. When planning the learning activities, 69.2% of the 26 teachers planned multiple learning activities. When performing the activities, 66.7% of the six teachers performed multiple learning activities. However, differences were observed as well. The most striking difference was that none of the participants had performed the same activities they had planned. All nine participants that performed learning activities report that their planned activities did not match their performed activities. This was shown in two ways. Firstly, two teachers reported having only performed activities they did not plan. Secondly, seven teachers

report having performed other additional activities next to their planned activity. For example, one teacher planned to ‘ask feedback from one or more students’, and reported to have performed two other activities next to this activity.

Collective learning activities. It was observed that both the planned and performed activities were primarily collective. However, teachers planned relatively more collective learning activities (59.1%) than they performed (45%). Zooming in on the learning partners, learning with colleagues was preferred when planning the learning activities, but teachers mainly performed learning activities with students.

Reflective learning activities. ‘Reflection on earlier relevant gained experiences’ was a popular activity in both the planned and performed activities. It accounted for 15.6% of the planned activities. When performing this activity, it was even reported as the most performed activity of all with 30%. Four teachers planned to perform this activity in combination with ‘searching for information in a book or on a website’. This was performed by one of these teachers.

Active learning activities. ‘Learning by trying out multiple things’ was planned in 10.6% of the cases and increased popularity in the performed activities where it was reported in 15% of the cases. Four teachers planned to combine active learning with ‘searching for information in a book or on a website’. This was not performed by a single teacher.

Combining collective, reflective, and active learning activities. Teachers reported combinations of the three types of activities in both the planning and performing stages of the learning process. However, in both stages, most teachers reported one type of learning activity. A combination of all three types of learning activities was planned by two teachers and performed by two other teachers. A combination of collective and reflective learning was planned by five teachers and performed by one teacher. A combination of collective and active learning was planned by four teachers and was not performed. A combination of reflective and active learning was not planned but was performed by one teacher.

Learning Activities Summarised

Four conclusions provide the answer to the second research question “What type of learning activities do teachers choose?”. Firstly, teachers plan and perform multiple learning activities. Secondly, all teachers performed other activities than they had planned. Thirdly, in both the planned and performed activities teachers primarily report collective learning, followed by reflective and active learning. Moreover, a slight preference for colleagues as learning partners was observed when planning collective learning activities, but students were

primarily reported as learning partners when performing collective learning activities. Fourthly, a combination of all three types of learning activities was planned and performed by two teachers and all other teachers make reports of one or two types of activities.

Learning Outcomes

To answer the third research question: 'What type of learning outcomes come from a self-directed teacher learning process?', this section will accommodate the coded learning outcomes to three types of learning outcomes: knowledge, skills, attitudes, and no learning outcome. Additionally, findings from a content analysis will be discussed.

From this point on, the results section is based on data from seven participants. This is a striking observation knowing that 79 teachers volunteered to participate in this study. Teachers explained this low response rate by reporting their reasons for dropping out in the first and second questionnaire. In the first questionnaire, 45 out of the 79 teachers that did volunteer to participate in the study did not set a learning goal of which 26 explained why. Most teachers indicated to experience a lack of time (38.5%) or to be too busy with other priorities (23.1%). In the second questionnaire, 26 teachers that did set a learning goal did not work on that goal and five of them explained why. Again, most of the teachers, three out of five, indicated to have experienced a lack of time.

Outcomes in Knowledge, Attitudes and Teaching Practices

Knowledge. A total of six teachers reported an acquisition of knowledge. 'Knowing how' was reported by three teachers and refers to having knowledge about a certain teaching behaviour. Teachers report to have gained knowledge about filming: *"Filming is effective, it takes less time to judge the jumps"*, preparation: *"When I prepare very well there are more possibilities than I had expected"*, and student reflection: *"Students are able to reflect on themselves if they are properly guided in this process"* 'Knowing that' was reported by two teachers and refers to the acquisition of factual information. Both teachers have learned things about their students. One teacher who asked students to come up with new types of assignments reports: *"I have learned that my students' answers match my ways of teaching and the assignments I give"*. Another teacher who guided students in reflection procedure reports: *"That students will pick it up in second intent"*. 'Knowing why' was reported by one teacher and refers to the recognition of when, why and under what circumstances a certain teaching approach should be used. This teacher reports to have learned that: *"coordinating and keeping tabs are important in order to adjust if necessary".*

Attitudes. A learning outcome that related to the potential change in a teacher's attitude towards learning and educating was reported by one teacher. This teacher reported an insight into the personal learning process: "*I should have some kind of rough draft and then create new assignments systematically based on goals*." This report was coded into 'Knowing about myself' which refers to changes in a teacher's identity and the awareness of one's learning processes.

Skills. Not a single teacher reported to have developed the use of a new skill or teaching practice.

No learning outcome. In addition to the reports discussed above, one teacher's report was coded as a 'Description of an experience', which refers to descriptions of learning experiences without stating a specific learning outcome. This teacher reported an observation without stating what has been learned from this: *"all jumps have been taught and still students have their freedom of choice up to a certain extent".* It should be mentioned that this individual teacher did learn something because this teacher reported two outcomes of which one was coded as 'knowing how'.

Learning About Teaching Practices

Above, it is concluded that all reports were cognitive and no practical use of teaching practices was reported. However, a closer look into the qualitative reports showed that teachers did not report to have used new teaching practices, but did report to have gained knowledge about a teaching practice. It was observed that six reports were focused on teaching practices. The two remaining reports were focused on student behaviour.

Teaching Practices. Out of the six reports that focused on teaching practices on a cognitive level, three were coded as 'knowing how', one as 'knowing why', one as and 'knowing about myself', and one as 'description of an experience'. Among the three reports coded as 'knowing how', one teacher reported to have gained knowledge about the use of filming as an assessment tool, another teacher reported to have learned more about preparation of lessons, and a third teacher described a cognitive outcome regarding guidance of reflection processes of students. One of the reports was coded as 'knowing why' and indicated that the teachers learned that the practices of coordinating and keeping tabs are important if one wants to adjust. 'Knowing about myself' was coded for a teacher that reported an outcome in attitude towards the personal learning process regarding the creation of goal-based assignments. One teacher reported a 'description of an experience' in which it was stated how the use of a new approach to the assessment of jumps is experienced.

Student behaviour. The two teachers that did not report outcomes focussed on teaching practices both reported to have gained knowledge about their students' behaviour. One teacher learned that students' answers match the example given by the teacher. The other teacher learned that students learn something in two stages. Both of these reports were coded as 'knowing that'.

Learning Outcomes Summarised

The answer to the third research question is twofold. Firstly, the learning process teachers participated in during this study did not generate outcomes in the use of teaching practices and only brought about cognitive outcomes, in six cases in teachers' knowledge and in one case in a teacher's attitudes. Secondly, looking into the qualitative reports it is concluded that teachers reported to have learned about teaching practices in six cases and about student behaviour in two cases.

The Relation between Goals, Activities and Outcomes

In the following section, the fourth sub-question will be answered: "How do teachers' learning goals, activities and outcomes relate?" To do so, the emergence of the self-directed TPD processes is displayed in Figure 1 and Figure 2. These Sankey diagrams display the three steps of the learning processes as follows. Firstly, it is displayed how the learning goals are coded regarding their content and depth. Secondly, it is displayed what learning goals are related to what performed learning activities. The planned activities are left out of the diagram because these have not occurred and did therefore not affect the further emergence of the learning processes. Thirdly, it is displayed what learning activities generate what learning outcomes. In addition, links between steps of the learning process that are reported by two or more teachers are considered patterns and are highlighted as green lines in the diagram.

Figure 1

Sankey Diagram of 34 Self-Directed TPD Processes

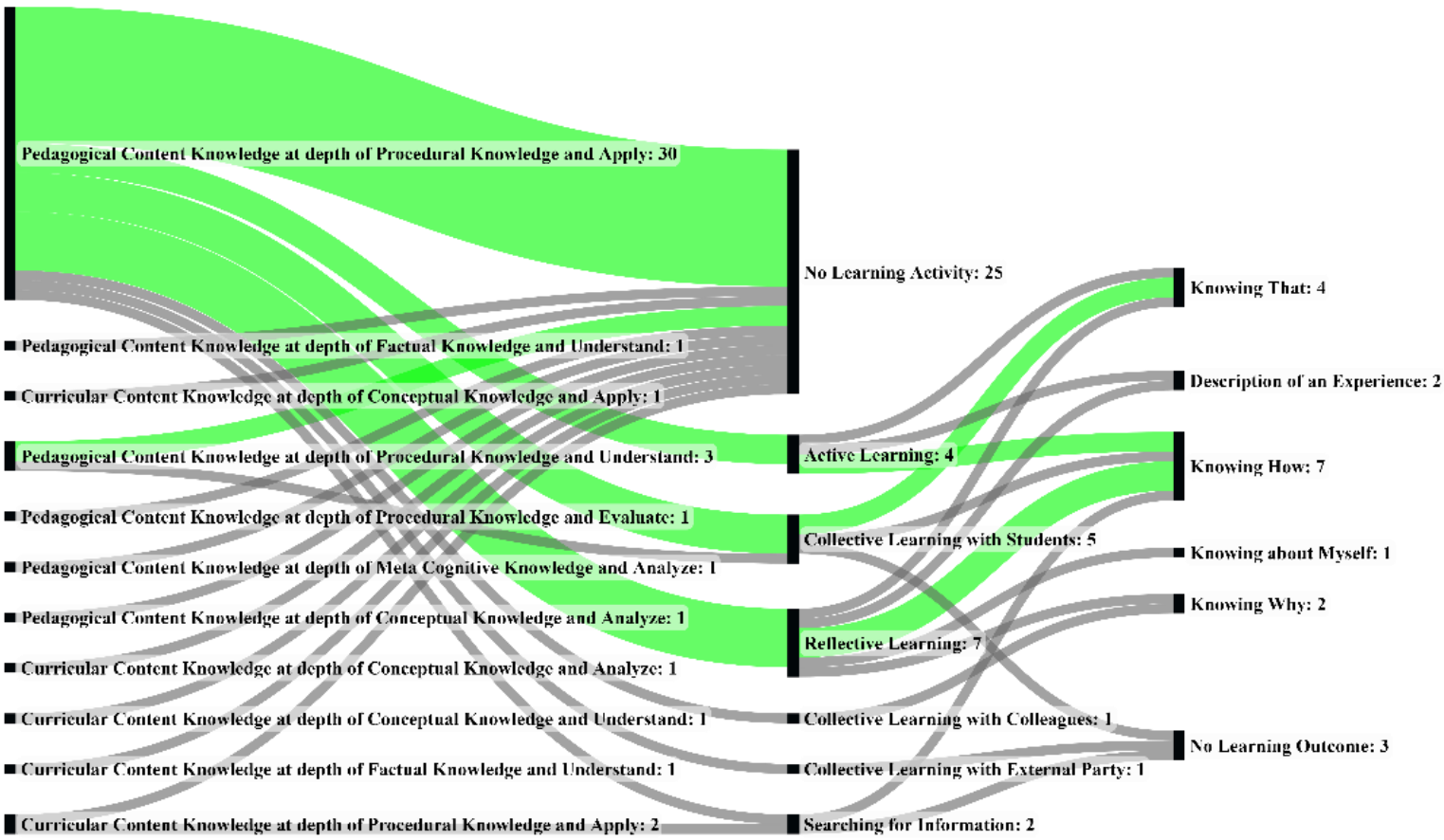
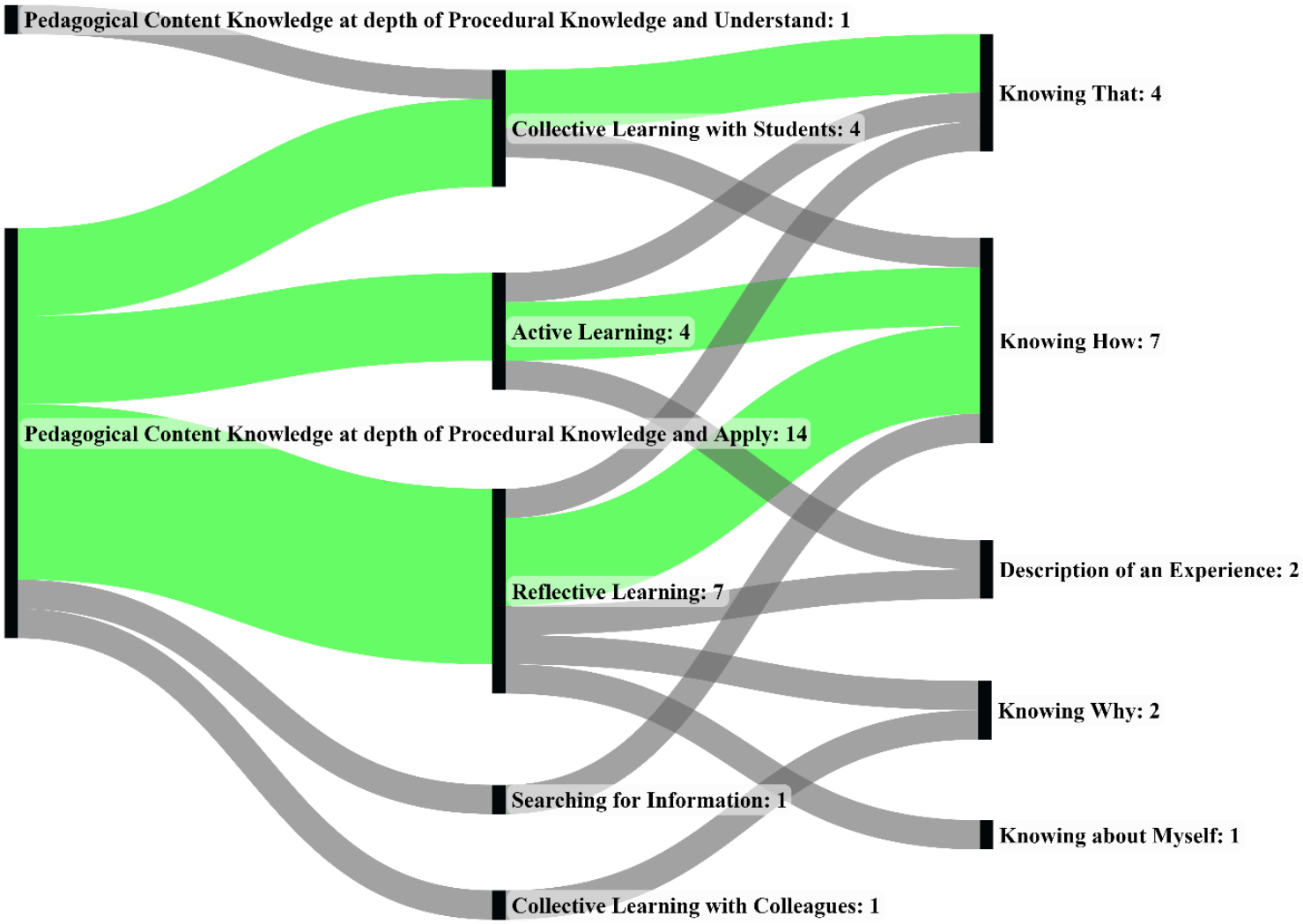


Figure 1 displays the reports in the three steps of the learning processes of the 34 participants that started a learning process by setting a learning goal. The main pattern observed in this Sankey Diagram is the fact that 25 teachers stopped their learning process after setting a learning goal. Of the remaining nine teachers, two have performed an activity but did not report a learning outcome. Seven teachers did complete all three steps of the learning process. Figure 2 zooms in on these seven learning processes and will be used to answer the fourth sub-question by determining the relations between goals and activities, activities and outcomes, and goals and outcomes.

Figure 2

Sankey Diagram of Seven Completed Self-Directed TPD Processes



Goals and Activities

Figure 2 shows that all seven participants have set a learning goal focused on a teaching practice, of which one teacher aimed to understand a teaching practice and the other six teachers aimed to apply the practice in their teaching behaviour. Teachers subsequently performed one or more learning activities. At this stage, three patterns are observed. Firstly, all six teachers that aimed to apply a teaching practice engaged in reflective learning. Secondly, four of these teachers reported collective learning of which three teachers engaged in collective learning with students and one with colleagues. Thirdly, three of these teachers reported active learning. Combinations of learning activities were only reported by teachers that aimed to apply a teaching practice. It is reported that five of these teachers combined different types of learning activities of which two teachers combined reflective, active and collective learning, one teacher combined reflective and collective learning, one teacher combined reflective and active learning, and one teacher combined reflective learning and searching for information.

Activities and Outcomes

Linking the learning activities to the learning outcomes, three patterns are observed. Firstly, reflective learning was reported seven times which lead to ‘knowing how’ in three cases. Secondly, active learning was reported four times which led to ‘knowing how’ in two cases. Thirdly, collective learning with students was reported three times and led to ‘knowing that’ in two cases. Looking into the qualitative reports of these outcomes, it is found that the two teachers that engaged in collective learning with students both reported outcomes related to student behaviour. Furthermore, it was observed that five teachers performed combinations of learning activities of which two teachers reported a the same combination of reflective, active and collective learning activities. However, because these teachers both reported different types of outcomes, it is concluded that no relations between combinations of learning activities and learning outcomes can be derived from these reports.

Goals and Outcomes

Comparing the goals and outcomes it is observed that six teachers aimed to apply a teaching practice, but not a single teacher reported the use of a new teaching practice as a learning outcome. This would indicate that goals and outcomes do not remain congruent and do therefore not relate. However, looking more closely into the learning outcomes in the

content analysis, five teachers reported to have learned something about a teaching behaviour on a cognitive level. For example, one of these teachers aimed to use a new way to assess jumps in physical education and reported to have learned something about filming as an assessment method: *"filming is effective, it takes less time to judge the jumps"*. Another teacher aimed to provide extra help and explanation to students who need it and reported learned how to realise this: *"When I prepare very well there are more possibilities than I had expected"*. The two teachers that did not learn about teaching practices reported to have learned something about student behaviour. The content of their learning goals and outcomes remained congruent throughout the learning process as well. One of them described a twofold plan for the implementation of new work forms that included asking input from students and using this input in practice. In the outcomes, this teacher reflected on the first step of the plan and reported: *"I have learned that my students' answers match my ways of teaching and the assignments I give"*. The other teacher aimed to make students reflect and make conscious decisions. This teacher reported the insight: *"That students will pick it up in second intent"*.

The observed unity between the learning outcomes has to be explained. It is striking that almost all outcomes remain congruent with the content of their learning goals, but are all on a cognitive level whilst most teachers aimed to learn something on the practical level of application. A possible answer is an observed unity within the learning goals. It was observed that all seven teachers that completed the full study did not clearly state what they intended to learn, but instead described what they planned to do in the upcoming period. It might even be argued that these goals can be better referred to as teaching plans instead of learning goals. To properly explain this claim, all seven learning goals will be presented here. One of the teachers planned a new type of assessment to implement: *"students can choose from the jumps offered for assessment based on their own motoric skill and preference"*, another teacher even formulated a goal that started with *'I am going to…'* and describes a twofold implementation plan for new forms of work: *"I am going to ask my students in class 4M, 4V and 5V to suggest a form of work that works best for them to process the material. I am going to look at these forms of work and use them in class where possible"*, a third teacher planned to provide more choice and differentiation: *"provide more education with choice and differentiation",* a fourth teacher planned to provide more differentiation and explanation: *"In the next three weeks I want to provide extra help and explanation in my second grade class to students who need it"*, a fifth teacher planned to raise awareness for a certain topic: *'Raise awareness for this topic in every meeting with teachers'*, a sixth teacher planned to provide good feedback: *"Provide all students in my vwo4 class with good feedback through an online*

system for individual feedback", a seventh teacher planned to make sure students would reflect and make conscious choices: *"Make sure students reflect on their produced work and that they make conscious decisions in this process."* The formulation of these learning plans did not allow teachers to reflect on what they had learned but instead made them report cognitive insights as side effects of their teaching plans as their learning outcomes.

In conclusion, most teachers aimed to apply a new teaching practice but report to have learned something about a teaching practice on a cognitive level. A possible explanation for this discrepancy lies in the observation that teachers have set teaching plans instead of learning goals, which made them focus on facilitating student learning and report cognitive side effects of this process. It is argued that teachers should be guided in setting clear learning goals that make them focus on their own development process. Despite this discrepancy, it can also be concluded that the content of the learning goals and outcomes remained congruent throughout the learning processes.

Relations Between Goals, Activities and Outcomes Summarised

A threefold answer is provided to the fourth sub-question: how do teachers' learning goals, activities and outcomes relate? Firstly, it can be concluded that teachers set learning goals focused on teaching practices and engage in reflective learning to attain their goals. Secondly, reflective and active learning activities generate outcomes in knowing how, and collective learning with students leads to learning about student behaviour. Thirdly, goals and outcomes are strongly related because their content remains congruent. However, the reported outcomes are all on a cognitive level instead of the practical level of application at which the learning goals were set. It is argued that this can be explained by the formulation of learning goals as teaching plans, which make teachers focus on facilitating student learning and report cognitive side effects of this process instead of focussing on their own learning process.

Discussion

Conceptualisation of the Self-Directed TPD Process

The central aim of this study was to explore the self-directed TPD process in the context of educational change and answer the research question: "How do teachers in secondary education go through a self-directed professional development process?" A synthesised answer to this question is that teachers aim to develop teaching practices, perform other activities than they plan, do not plan and perform the ideal combination of collective, reflective and active learning activities, and report cognitive outcomes only that are primarily focused on teaching practices. The emergence of this answer and possible explanations will be described below following the three steps of the self-directed TPD process: formulating learning goals, performing learning activities, and reflecting on learning outcomes.

Learning Goals Discussed

It was hypothesised that the teachers in this study would primarily focus on the development of their teaching practices. This hypothesis is confirmed with 31 out of the 34 goals focusing on teaching practices. The emphasis of TPD on the development of teaching practices was already imposed by teacher educators and researchers. Shulman (1986) stated that TPD emphasises the development of teacher's skills, rather than the development of teacher's knowledge. Other researchers argued for the benefits of this emphasis because educational change requires changes in the practice of individual teachers (Guskey, 1985; Timperley, 2008). As an addition to these findings, the present study shows that the emphasis on teaching practices does not have to be externally imposed by teacher educators or researchers, but is already acknowledged by the self-directed learning teachers.

On a critical note, It is observed that the goals in the present study were formulated as teaching plans. For example, a participant planned to provide more choice and differentiation: *"provide more education with choice and differentiation."* It is argued that these teaching plans made teachers focus on facilitating student learning which caused the reported learning outcomes to be cognitive side effects of the teaching plans. This aligns with previous studies as Van den Bergh et al. (2015) stated that teachers tend to focus their learning goals on the achievement and well-being of their students instead of on their personal learning process. Teachers in Van Eekelen et al. (2005) have also shown to struggle in defining their learning goals. This is an unfortunate conclusion because it is important to set well-defined learning goals in order to consciously steer a learning process towards the desired outcomes (Cwikla,

2002; Endedijk, 2010). Janssen et al. (2012) acknowledged this importance and explored if setting requirements for learning goals and providing guidance in meeting these requirements would aid in the formulation of well-defined learning goals. Participants in their study set learning goals according to the competence list for teachers used by the Dutch government and had to make clear in what job situation development of a competence would be demonstrated. In their study it is concluded that teachers that were guided in meeting these requirements were more capable of formulating clear learning goals than unguided teachers. Based on these findings, teacher educators are advised to introduce requirements for learning goals and to guide teachers in meeting these requirements.

Learning Activities Discussed

It was hypothesised that the participants would perform the required collective, reflective, and active learning activities. This hypothesis is confirmed because the reports of the teachers in the present study together indicate that all types of learning activities were performed. However, although the results showed that teachers both planned and performed multiple learning activities, combinations of the three types of learning activities was only planned by two teachers and performed by two other teachers. All other participants made reports of one or two types of activities. Therefore, it should also be mentioned that self-directed teacher learning in this study did not meet the second requirement of effective TPD, which states that each teacher should engage in collective, reflective and active learning (Darling-Hammond et al., 2017; Desimone, 2009). A possible practical explanation for not meeting this requirement is that teachers did not have enough time to engage in all these activities. The present study followed learning processes of three to five weeks and TPD has shown to be effective when sustained over a longer period of time (Darling-Hammond et al., 2017; Desimone, 2009). Support is provided for TPD that is spread over a semester (Desimone, 2009). Future research conducted over a longer period has to determine if self-directed learning teachers engage in the required collective, reflective and active learning activities.

An additional finding that should also be discussed is that all teachers performed other activities than they had planned. Meaning that teachers only performed activities they did not plan or that teachers performed additional activities next to their planned activity. Learning from activities that are not planned aligns with previous studies. Kwakman (1999) concluded that secondary education teachers mostly do not deliberately search for learning activities, but primarily learn as a result of activities or situations that occur. Van Eekelen et al. (2005)

studied higher education teachers who reported that two-third of the learning activities was unplanned. Student teachers in Endedijk (2010) have reported that 45% of the learning experiences occurred unplanned. In the present study, teachers have also learned from a combination of planned and unplanned activities. With this knowledge, teacher educators should facilitate a learning trajectory in which teachers can learn from both planned and unplanned activities. Also, this once more illustrates the importance of the formulation of clear learning goals because a clear learning goal can guide the learner in choosing the right learning activities that spontaneously occur in practice (Endedijk, 2010).

Learning Outcomes Discussed

It was hypothesised that the self-directed learning process in the present study would generate changes in knowledge, skills, and attitudes with a focus on teaching practices. This hypothesis has to be rejected because the development of skills was not reported. It is concluded that teachers only report cognitive outcomes with six reports of knowledge, one report of attitudes, and no reports of skills. Although the use of skills was not reported, the cognitive outcomes remained congruent with their learning goals and five of the seven cognitive outcomes described that a teacher had learned something about a teaching practice. Additionally, it was found that the two outcomes that did not relate to teaching practices related to student behaviour and were in both cases generated by collective learning with students.

The finding that self-directed TPD only brought about cognitive outcomes is not in line with reports of the student teachers in Endedijk (2010) and the teachers in religious education in Porter & Freeman (2020) who reported to have primarily changed their teaching practices. This discrepancy can be explained by the intensity of the learning processes. Student teachers in Endedijk (2010) made reports about their learning process at six moments in six consecutive weeks and were as students self-evidently involved in a constant learning trajectory. The learners in Porter & Freeman (2020) report about a learning process of 20 to 40 hours within one to nine months. The present study was conducted in a shorter period of three to five weeks and only measured learning in two questionnaires. Van Eekelen et al. (2005) have designed a comparable study over a shorter period of four weeks and fewer learning experiences through a pre- and post-interview and three diary reports per week. Looking at their results, this less intense learning trajectory has also primarily generated cognitive outcomes. In their study, this result is interpreted as a report of teachers being in the stage of cognitive consciousness about their teaching practices before stepping into the next

stage of changing these practices. Following this line of reasoning, reported outcomes in the present study indicate that the participants are in this first stage of consciousness. It is argued that a more intense learning trajectory of longer duration and more learning experiences would enable the learners to step into the second stage of changing their teaching practices.

Implications

Educational change requires a change of the practices of individual teachers (Guskey, 1985; Timperley, 2008). Previous studies in different contexts have described various conclusions regarding the effectiveness of self-directed TPD for teacher change. Student teachers and teachers in religious education report changes of teaching practices as their main outcome (Endedijk, 2010; Porter & Freeman, 2020), but teachers in higher education mainly report acquisition of knowledge about their subject (Van Eekelen et al., 2005). The secondary education teachers in the present study independently emphasised the development of teaching practices without any guidance of teacher educators and primarily report learning outcomes focused on teaching practices. Therefore, it is concluded that self-directed TPD in secondary education has the potential to generate teacher change and can help in the implementation of educational changes. However, although all learning outcomes focused on teaching practices, no actual changes of practice have been reported because the outcomes were all reported as cognitive knowledge about teaching practices. Therefore, future research will have to evaluate if the natural focus of self-directed TPD on teaching practices leads to the actual change of practices.

From a practical perspective, the present study showed that 72 out of the 79 volunteers dropped out of the learning process at a certain point. The teachers that explained this choice primarily stated that this was caused by a lack of time or other priorities. Going forward, teacher educators should prevent learners to drop out by facilitating a long-term learning trajectory suggesting efficient time-saving learning activities that self-directed learners can choose to engage in. As argued above, a longer duration will also aid in the effectiveness of TPD (Darling-Hammond et al., 2017; Desimone, 2009). Furthermore, based on findings in Van Eekelen et al. (2005) it is argued that the longer duration might also help teachers to move from cognitive learning outcomes about teaching practices to the actual change of teaching practices.

Limitations

Several limitations occurred in the methodology of the study that might have influenced the answers to the research questions. Firstly, the present study used two questionnaires as measurement instruments. This is a limiting factor because explorative research can be executed with a wide variety of qualitative and quantitative methods (Stebbins, 2001). The use of additional instruments such as case studies, interviews, or observations might have aided to a more extensive exploration of the self-directed TPD process.

Secondly, the reported learning activities and outcomes were influenced by the fact that the present study followed TPD processes of three to five weeks. As argued above, a learning process of longer duration might have enabled the teachers to perform a wider variety of learning activities and to change their teaching practices instead of only learning about them. Furthermore, effective teacher learning in general requires involvement in learning activities over a longer period of time (Darling-Hammond et al., 2017; Desimone, 2009; van Veen et al., 2012). More specifically, TPD starts to be effective when conducted for at least one semester (Desimone, 2009).

Thirdly, the small sample size endangers the generalisability of the results. A total of 79 out of the 350 approached teachers volunteered to participate, of which 34 teachers started their learning process by formulating a learning goal. Subsequently, nine teachers reported performed activities and seven teachers completed the full study by reporting their learning outcomes. The present study initially aimed to explore the self-directed teacher learning processes from start to finish, of which data was provided by only seven teachers. On a positive note, the fact that teachers dropped out is data on itself and additional data was collected that illustrated why teachers dropped out.

Lastly, a main form of bias in the present study should be mentioned as a limitation because researcher bias is considered inevitable in qualitative research (Mehra, 2002). Although qualitative research does not aim to gather unbiased data only, one should be aware of the fact that interpretation of qualitative reports does automatically occur (Ales, 2014). A way to minimise this source of error is computing the interrater reliability using Cohen's Kappa (McHugh, 2012). Kappa values of the codebooks have been computed and showed that these could be considered as reliable. However, the present study also presents results based on a content analysis of the learning goals and outcomes executed by the researcher. The interpretation bias of these results could have been minimised as well. For example, by involving other researchers in the analysis of the qualitative data (Ales, 2014).

Future research

The discussion section made suggestions for research into self-directed TPD and for the facilitation of self-directed TPD. Regarding future research, it is argued that it should be evaluated if the natural focus of self-directed TPD on teaching practices leads to the actual change of practices. Also, future research should be of longer duration, use multiple measurement instruments, include a larger sample size, and interpret qualitative data with multiple researchers. Regarding the facilitation of self-directed TPD in the future, it is argued that the formulation of learning goals should be guided, planned and unplanned learning activities should be facilitated, and learning trajectories should be conducted over a longer period of time. The present study proposes the use of diaries, which are instruments in which participants repeatedly report their experiences regarding a certain phenomenon (Bolger et al., 2003). It is argued that diaries can comply with the suggestions for future research when used as measurement instrument and with the suggestions for facilitation of self-directed TPD as learning instruments.

Diaries as Measurement Instruments

When used as a measurement instrument diaries can evaluate if self-directed TPD leads to changes in teaching practices and comply with the requirements for future research. Firstly, diaries can be used for a longer period of time. Diary studies vary in their duration with studies lasting for one day and other studies lasting up to nine months (Janssens et al., 2018). Secondly, diaries can be used in combination with other instruments. For example, Van Eekelen et al. (2005) used diaries and two questionnaires in their study. A more recent study into reflective teaching combined diaries with interviews and observations (Tabassi et al., 2020). Thirdly, the problem that occurred in the present study with teachers dropping out resulting in a small sample size is prevented in previous diary studies. All participants in Tabassi et al. (2020) and Van Eekelen et al. (2005) have completed these diary studies. This indicates that diary studies are able to maintain their sample of participants throughout the study. Lastly, the involvement of multiple researchers in the interpretation of qualitative data is a choice that can be made. On a side note, the involvement of multiple researchers should be communicated to participants by mentioning this in the informed consent form.

Diaries as Learning Instruments

When used as a learning instrument, diaries can be designed to comply with the requirements for the facilitation of self-directed TPD. Firstly, diaries can be designed to guide the formulation of learning goals. For example, the requirements for learning goals used by Janssen et al. (2012) can be communicated to teachers before they formulate their learning goal. Another possibility is to provide this guidance in workshops which has shown to be effective (Janssen et al., 2012). However, this will make a learning process not fully self-directed. Secondly, diaries can facilitate both planned and unplanned learning activities because they have the ability to capture all learning activities that occur (Bolger et al., 2003; Ohly et al., 2010; Reis, 2011; Schmitz & Wiese, 2006). Lastly, diaries can be used for a longer period of time as argued above.

As an additional benefit, it should be mentioned that diaries have shown to change teaching behaviours. Diaries are not only used to report experiences, but also as a mediational space where teachers express experiences and thoughts on which they reflect to retrieve new beliefs of themselves and their teaching practices and eventually change their actual teaching behaviours (Golombek & Johnson, 2004). Teachers not only change their behaviours, but diaries are capable of changing behaviour in the desired direction, also known as the reactivity effect. This effect is caused by the high frequency of reflection and refers to the findings that constant self-monitoring steers the change of behaviour in the direction that is desired (Korotitsch & Nelson-Gray, 1999).

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Appendices

Appendix A. Codebook Learning Goals

Theme	Code	Definition	Example
Content of learning goals (Shulman, 1986)	Subject matter content knowledge	The knowledge present in the mind of a teacher including facts, substantiation of these facts and possible circumstances that can weaken or deny them.	*I am a math teacher and want to be able to answer all questions of my brightest students by learning more about the newest math insights.* *I am a geography teacher and want to learn more about the current situation at the border between North- and South-Korea.*
	Pedagogical content knowledge	The knowledge of how to teach. Knowing what strategies to use to represent and formulate the subject in a way that is understandable for students.	*I want to learn how to use cooperative learning strategies in my daily teaching practice.* *I want to learn how to guide learning with a Virtual Reality application in my classroom.*
	Curricular knowledge	The knowledge about (1) all programs designed for the teaching of a particular subject and topic at a given level, (2) the variety of instructional materials available in relation to those programs, and (3) the	*I want to learn what virtual reality applications are suitable to use in the educational context.*

		characteristics that indicate in what circumstances to use particular curriculum or program materials.	*I want to learn when I can effectively use virtual reality applications in the classroom.*
Depth of addressed cognitive process (Bloom's Taxonomy)	Remember	To recognize or recall relevant knowledge from long-term memory.	*I am a chemistry teacher and want to be able to remember all elements of the periodic table.* *I am a history teacher and want to memorise all dates my students have to memorise at their tests.*
	Understand	To interpret, exemplify, classify, summarize, infer, compare or explain the meaning of information	*I am a chemistry teacher and want to categorise the elements in the periodic table from easy to hard for my students* *Recently, all teachers in my school are expected to use a shared google calendar. I want to learn how to read and interpret this calendar.*
	Apply	To execute and implement a learned procedure in a given situation.	*I want to learn how to implement collaborative learning in my daily teaching practice.*

			I want to learn how to mediate in a bullying situation.
	Analyse	To organize material by breaking it into its constituent parts and to determine how the parts are related to one another as well as to an overall structure or purpose.	*I want to learn how my students' test results relate to their learning motivation.* *I want to learn how virtual reality applications can boost my students' learning motivation.*
	Evaluate	To check and formulate critique to judgments based on criteria and/ or standards	*I have been applying collaborative learning in my teaching practice for a while now. I want to check if this has increased my students' learning results.* *I want to learn how the use of virtual reality in my classroom has influenced my students' learning motivation.*
Depth of addressed knowledge (Bloom's taxonomy)	Factual knowledge	Knowledge of discrete and isolated content elements, or 'bits of information'. It includes knowledge of terminology and knowledge of specific details and elements.	*I am a history teacher and want to learn more about the newest insights in the discovery of Anne Frank.*

		I want to learn more about the definitions of learning motivation.
Conceptual knowledge	Knowledge of more complex, organized knowledge forms. It includes knowledge of classifications and categories, principles and generalizations, and theories, models, and structures.	*I want to learn how the newest insights in the case of Anne Frank have influenced the view on the holocaust in The Netherlands.* *I want to learn what can influence learning motivation.*
Procedural knowledge	Knowledge of how to do something, in order to know 'when to do what'. It includes knowledge of skills and algorithms, techniques and methods.	*I want to learn how to use digital learning in my daily teaching practice.* *I want to learn more techniques to increase my students' learning motivation*
Meta-cognitive knowledge	Knowledge about cognition in general and knowledge about and awareness of one's own cognition. It includes strategic knowledge; knowledge about cognitive tasks; and self-knowledge.	*I want to learn how skilled I am in digital learning myself.* *I want to learn how my personal motivation to learn influences my students' motivation to learn.*

Appendix B. Codebook Learning Outcomes

Code	**Definition**	**Example**
Description of an experience	The teacher describes an experience, but does not make clear what he/she has learned from this experience.	*We talked about motivation.* *My students are always on time.*
Knowing that	The teacher obtained new knowledge or information as a learned fact.	*I have learned that there is a relation between performance anxiety and perfectionism.* *I have learned that motivation is an important catalysator for learning.*
Knowing how	The teacher has learned new knowledge about a certain teaching behaviour.	*I have learned that an anxiety for speaking in the classroom can be overcome by trusting in one's own skills.* *I have learned that the use of collaborative learning strategies boosts learning motivation*
Knowing why	The teacher has learned when, why and under what conditions a certain kind of teaching is important or good to do.	*I have learned that anxiety for speaking in the classroom can be overcome by trusting in one's own skills because an internal cognitive process has to be overcome by another internal cognitive process.*

		I have learned that collaborative learning strategies are most effective if students are familiar with each other.
Rule of thumb	The teacher has learned a strict rule that should always be followed.	*Never start a lesson with a negative feeling towards pupils. Instead, Always start a lesson with a positive feeling towards pupils.* *Always make sure that your students know what to expect from you.*
Knowing about myself	The teacher has changed something in his/her identity or created more awareness of his/her learning process.	*I have to trust in my own skills.* *I have learned that I have to use more collaborative learning strategies.*
Specific teaching practice	The teacher has developed a specific teaching behaviour.	*I have learned how to teach my students' speaking fluency.* *I have already learned how to use three collaborative learning strategies in my daily teaching practice.*
No learning outcome	The teacher indicates that no learning outcome has been realised.	*I intended to learn more collaborative learning strategies. Unfortunately, I did not find any new strategies.* *I had no time to participate in any learning activities, so I did not learn anything.*

Appendix C. Codebook Reasons for Dropping Out

Code	**Definition**	**Example**
Lack of time	Reasons for dropping out related to the experience that there is not enough time to engage in the learning process.	*"No time"* *"Time is too short"*
Other priorities	Reasons for dropping out related to the fact that one is too busy with other priorities.	*"Too busy with other things"* *"I am working on group dynamics"*
Already working on it	Reasons for not engaging in a learning process because one is already working on the subject in another way.	*"Already working on it"*
Working on other goals	Reasons for not engaging in a new learning process because one is already working on other goals.	*"I am working on goals for my own subject"* *"I have enough open learning goals"*
Not part of my job description	Reasons for not engaging in a learning process because it does not belong to one's job description.	*"Not my job description"* *"Does not belong to my tasks"*
Not involved in the trajectory	Reason for not engaging in a learning process because one is not involved in the change trajectory.	*"I am not involved in this trajectory"*

Cannot set up a learning goal	Reason for not engaging in a new learning process because one is not able to set up a learning goal.	*"I can not manage to set up a learning goal"*
Private circumstances	Reasons for dropping out of the learning process because of private circumstances.	*"Private circumstances"* *"I have been sick"*
External dependence	Reason for dropping out of the learning process because one dependent on an external party to form the learning process	*"My learning goal depended on the board"*