# Student teachers' way of learning

*Stimulating student teachers' deliberate practice and meaning-oriented learning during their internship in school-based teacher education*

Master thesis Human Resource Development


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**Abstract**

Improving the quality of the teacher education is subject of a lot of studies in the field of education. This study focuses on how the teacher education can prepare student teachers for continuous professional development after the teacher education. Two main questions are addressed: (1) how do student teachers and their mentors diagnose the students' learning orientation, and (2) how can meaning-oriented learning and deliberate practice of student teachers be stimulated during their internship in the teaching practice. Subjects were students of a one-year postgraduate teaching education program and their mentors. The first research question is based on the theory of scaffolding. It shows the way student teachers and their mentors diagnose the student teachers' learning orientation in comparison with the learning orientation measured by the Inventory Learning to Teach Process (ILTP). This data showed only a slightly agreement between student teachers' diagnosis and the ILTP, while student teachers' mentors significant overestimate the learning orientation of their student teachers compared with the ILTP. This means that student teachers' and their mentors' way of diagnosing first needs to be improved to provide good support during the intervention strategies. For answering the second research question, interviews were held to find out how the desirable ways of learning – meaning-oriented learning and deliberate practice – can, according to expert mentors, be stimulated within the teaching practice. This is based on the study of Bronkhorst, Meijer, Koster, and Vermunt (2011), who have examined among teacher educators how to stimulate both ways of learning within the teaching institute. This study resulted in 10 design principles for fostering student teachers' meaning-oriented learning and deliberate practice during internships. Together with the results of Bronkhorst et al. it provides a more complete answer in stimulating both ways of learning in the teacher education.

# 1. Introduction

Guiding student teachers in their professional development is the main task of the teacher education. During their education, student teachers in The Netherlands need to develop themselves in line with the requirements of the teacher education, which is established by 'Stichting Beroepskwaliteit Leren' (SBL) and adopted by Onderwijscoöperatie (2011). One of the seven required competencies is reflection and development, which should enable student teachers to continue their professional development after the teacher education (SBL, 2004). Although reflection and development is one of the requirements for student teachers to achieve, not much research has been done about how to stimulate this competency during the teacher education. Therefore, this study focuses on stimulating student teachers' meaning-oriented learning and deliberate practice, as both concepts contribute to continuous professional development (Ericsson, Krampe, & Tesch-Römer, 1993; Oosterheert, Vermunt, & Veenstra, 2002).

Student teachers' continuous development after the teacher education, also referred to as lifelong learning, is important in order to face the continuous changes of the teaching practice (Fairbanks et al., 2010; Knight, 2002; Oosterheert & Vermunt, 2001). This indicates, according to Oosterheert and Vermunt (2001), that students must be capable to construct knowledge by themselves. Meaning-oriented learning – improving performance by looking at the underlying processes of teaching and learning (Oosterheert & Vermunt, 2001) – and deliberate practice – improving performance during highly structured activities (Ericsson et al., 1993) – represent, according to Bronkhorst et al. (2011) "the crux of what it means to (learn to) learn as a teacher" (p. 1120).

For fostering student teachers' meaning-oriented learning and deliberate practice, this study builds on the theory of scaffolding. This means that, to support student teachers in this process, the support needs to be adapted to the students' understanding (J van de Pol, 2012). In line with the theory, this study first focuses on how student teachers and their mentors diagnose the student teachers' learning orientation. This will be compared with the Inventory Learning to Teach Process (ILTP), an instrument which measures the learning orientation of student teachers. The third step of scaffolding, using intervention strategies, contains the second part of this study, which is based on the study of Bronkhorst et al. (2011). They investigated how to stimulate meaning-oriented learning and deliberate practice within the teacher education, which resulted in 12 design principles. Teacher education programs in Western countries, however, have a dual focus, where student learning also takes to a great extent place during their internship (e.g. Hagger, Burn, Mutton, & Brindley, 2008). Instructional strategies to stimulate both ways of learning during the internship of the student teachers are not available yet. This article provides an answer on this, based on the conceptual understandings of expert mentors about meaning-oriented learning and deliberate practice in learning to teach, and how this, according to them, can be stimulated within the teaching practice. The results of this study give therefore, together with the results of Bronkhorst et al., a more complete view about how both concepts can be stimulated within the teacher education and in learning during internship.

This paper starts with a detailed description of professional development in the teaching practice and the two concepts meaning-oriented learning and deliberate practice. After this, the results of the study of Bronkhorst et al. (2011), where this study is partially based on, and the context in which this study takes place, is described. In the method section, the two research methods used in this study are explained, and the results derived from this research are set out further in the result section.

### 1.1 Professional development in the teaching practice

Continuous development of teachers is important in order to face the dynamic nature of the teaching practice, as it is described above. According to Mankin (2009), development has a longer term focus, which is concerned with the 'enhancement of an individual's personal portfolio of knowledge, skills, and abilities' (p.36), also called the professionalism of the teacher (Furlong, Barton, Miles, Whiting, & Whitty, 2000). The ongoing learning process that focuses on the developing of this professional expertise can be described as continuous professional development (Mankin, 2009). Within the teaching practice, teachers are seen as researchers in a dynamic process of continuous developing themselves (Anderson & Herr, 1999). This is inherent to how professionalism is seen in other settings. Knowledge of employees within an organization is becoming more important in, what Harrison and Kessels (2004) called, the emerging knowledge economy. This means that employees need to develop themselves, enhance their knowledge, and need to become researchers in their own organization. So, nowadays, continuous professional development is becoming more important in both education and other sectors.

There are two influencing factors on professional development to distinguish: personal factors and contextual factors (Oosterheert, Vermunt, & Veenstra, 2002; Vermunt, 1996; Vermunt & Endedijk, 2011). The personal factors, like for example the personality characteristics, personal experiences and gender, can, to a great extent, influence their way of learning (Kamarulzaman, 2012). The contextual factors can, according to Vermunt and Endedijk (2011), influence teacher learning. As described in the literature review of Vermunt and Endedijk, Clarke and Hollingsworth (2002) make a distinction in several types of learning environments in student teachers' learning during internship and their professional development: the type of intervention used, the social environment, the wider school or institutional climate, and other contextual variables.

The personal and contextual factors need to be taken into account when searching for ways to enhance the continuous development of the student teachers. In this study, the focus will lie on fostering student teachers' meaning-oriented learning and deliberate practice, while both ways of learning contribute, as described above, to their professional development and lifelong learning. These learning orientations are described more in detail below.

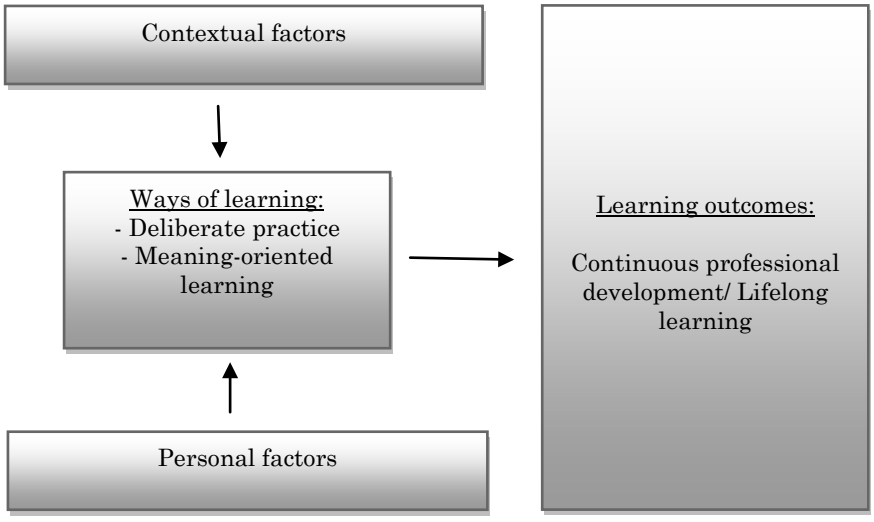


**Figure 1.** A model of influencing factors in student teachers' continuous professional development (based on Vermunt and Endedijk (2011))

### 1.2 Meaning-oriented learning (MOL)

Meaning-oriented learning is not the only learning orientation which students can have. Oosterheert and Vermunt (2001) set out a study to distinguish different orientations in learning to teach. According to the results of this and two additional studies about this subject (Oosterheert, Vermunt, & Denessen, 2002; Oosterheert, Vermunt, & Veenstra, 2002), these orientations are survival-, reproduction-, or meaning-oriented in nature. Survival-oriented student teachers learn to teach by doing without specific goals to pursue, and therefore leaving little room for learning. Reproduction-oriented student teachers want to improve their performance and are less interested in developing a frame of reference for teaching. Meaning-oriented student teachers want to improve their performance by gaining a better understanding of the underlying processes of teaching and learning.

As described in the study of Oosterheert, Vermunt, and Veenstra (2002), meaning-oriented learners can be divided into dependent meaning-oriented learners and independent meaning-oriented learners. They describe independent meaning-oriented learners as most independent in their learning, whereby they – by themselves – try to improve their performance by relating information from different sources to each other. In addition, they don't worry a lot about negative teaching experiences. The difference with dependent meaning-oriented learners is, according to Oosterheert, Vermunt and Veenstra, that these students much more rely on others in their learning process. They don't think that they are able to determine which aspects of their performance need to be improved, and they are much more worried about negative teaching experiences than students who are more independent meaning-oriented.

According to Oosterheert, Vermunt, and Veenstra (2002), there is a gradation within the learning orientations. Survival-oriented learning is seen as the least preferable way of learning, followed by a reproduction-oriented way of learning. Meaning-oriented learning is seen as the most desirable way of learning for fostering lifelong learning. The learning orientations of students are rather stable within a constant educational context, but they can be changed (Vermunt & Vermetten, 2004). This also applies for student teachers, as shown in the study of Endedijk, Vermunt, Meijer, and Brekelmans (2013). To prepare student teachers for lifelong learning, student teachers need to be stimulated and supported to change their learning orientation into a meaning-oriented way of learning (Oosterheert, Vermunt, & Veenstra, 2002). This change occurs in general in line with the gradation of the learning orientations, which means that student teachers probably change from survival- or reproduction-oriented learning towards a more meaning-oriented way of learning (Donche & Van Petegem, 2008; Endedijk et al., 2013).

### 1.3 Deliberate practice (DP)

Deliberate practice enhance continuous development and can help students to show higher quality performances (Ericsson, 2006; Ericsson et al., 1993). This indicates that the level of performance not only depends on the capabilities that students have, but also on their way of learning. Deliberate practice contains a highly structured activity, with improving performance as explicit goal (Ericsson et al., 1993). According to Ericsson et al. (1993), there are several conditions for optimal learning and improving performance: the learners' motivation and preexisting knowledge has to be taken into account, they should receive immediate informative feedback and knowledge of results of their performance and they should repeatedly perform the same or similar tasks. The learners' motivation, as mentioned in this definition, should be derived from the opportunity to improve their performance (Ericsson, 2003). The activity itself is therefore not necessarily enjoyable for the practitioner.

Deliberate practice activities can be very elementary, like planning and evaluation, which teachers usually do in their daily practice. According to Dunn and Shriner (1999),

these activities make them deliberate practice for teachers when they have the potential to "provide a teacher with opportunities to acquire new knowledge of teaching" (p. 644). However, deliberate practice only takes place when individuals also concentrate on their own development and trying to go beyond their current abilities (Ericsson, 2006). This means that the learning environment can stimulate a deliberate way of learning by offering deliberate practice activities, but it depends on the student teachers if and in which degree they participate in this learning process.

One of the main reasons for student teachers to get involved in deliberate practice activities is to refine their individual skills and to reach expert performance. According to Ericsson et al. (1993), higher levels of engagement in deliberate practice are associated with higher levels of performance. When learners want to become expert performers, this engagement also involves actively searching for aspects of their performance that they can improve (Ericsson, 2003). Continuous professional development is, besides quality, another important advantage of deliberate practice for the teaching practice.

### 1.4 Stimulating DP and MOL in teacher education

To guide student teachers in taking a next step in their learning process, the support needs to be adapted to a student's understanding (J van de Pol, 2012). The concept of scaffolding provides insight in what could be important elements in the guidance process. Scaffolding is related to Vygotsky's notion of the Zone of Proximal Development (ZPD), which describes "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). In this case it means that mentors should provide support that is adapted to the student teachers' need. As described in the literature study of Lin et al. (2012), the scaffolding process depends on cycles, in which the level of performance of the learner, the task demands, and the level of scaffolding needs to be related (Pea, 2004; Stone, 1998).

Scaffolding can be described in four steps (J van de Pol, 2012; J. van de Pol, Volman, & Beishuizen, 2011), based on the model of Ruiz-Primo and Furtak (2007): (1) using diagnostic strategies, (2) checking the diagnosis, (3) using intervention strategies, and (4) checking students' learning. This implies that, before using intervention strategies to, in this case, foster student teachers' meaning-oriented learning and deliberate practice, mentors should be aware of the actual learning orientation of their student. In provides them with the knowledge to provide adaptive support during the intervention strategies, which should support the process of change of the student teacher to a more meaning-oriented way of learning (Oosterheert & Vermunt, 2001). After the first two diagnosing steps, this change can occur by using intervention strategies. In this study, this is based on the research of Bronkhorst et al. (2011), who investigated how student teachers' meaning-oriented learning and deliberate practice can be stimulated within the one-year teaching education program. In their study, twelve expert teacher educators were interviewed in order to gain sufficient knowledge about how they think both concepts can be stimulated among student teachers. In the interviews, the expert teacher educators were asked for their conceptual understanding, after which they could give their opinion about ways to stimulate meaning-oriented learning and deliberate practice.

In the study of Bronkhorst et al. (2011), meaning-oriented learning was defined by the expert teacher educators as: "learning to teach by developing an informed, personal theory of practice" and deliberate practice as: "deliberating teaching to enhance learning" (p. 1127). The concept of deliberate practice had however a dual focus, according to the expert teacher educators: deliberate practice means shaping practice to be educative for student teachers as well as for the pupil. In the study of Bronkhorst et

al., this is described as "enactment conceptualization of deliberate practice: the ability of the student teacher to put his or her intentions – based on an explicit theory of practice – into action to benefit pupil learning" and regulation conceptualization of deliberate practice: "the ability of the student teacher to seek or create optimally educative practice experiences" (p.1124).

The opinions of expert teacher educators about ways to stimulate deliberate practice and meaning-oriented learning were formulated in the article of Bronkhorst et al. (2011) as design principles. However, the expert teacher educators indicated that, before learning can take place, the student teachers need to have some basic teaching routines. Next to this, the differences in student teachers' development should be taken into account, and the structure of the teacher education programs is crucial in fostering both ways of learning. Considering these three preconditions, 12 design principles were formulated.

There are five design principles to stimulate meaning-oriented learning, as shown in the study of Bronkhorst et al. (2011). The first design principle is 'challenge student teachers' assumptions'. To make implicit assumptions explicit, student teachers are invited to think about and reconsider their assumptions about teaching. The second design principle is 'decontextualize student teachers' practice'. By posing *why* questions, practice can be analyzed to discover underlying processes of learning and teaching. Third, 'include diverging perspectives' is formulated as a design principle. This means that student teachers should look at other practices and perspectives to show the diversity of ways in which teaching can take place. 'Require student teachers to study pupil learning' is the fourth design principle, where student teachers need to consider which effect their behavior has on their pupils. 'Model meaning-oriented learning' is the last design principle for stimulating meaning-oriented learning by student teachers. Modeling the desired learning to teach can help student teachers to take over this way of improving their own performance.

There are four design principles for the enactment conceptualization of deliberate practice. 'Work from student teachers' explicated theories of practice' is the first one, where student teachers should make their developing frame of reference explicit, which they can use as a starting point in their learning process and to evaluate their development. The second design principle is 'promote anticipatory reflection'. "In this process student teachers learn to anticipate teaching, taking into account their own abilities and classroom affordance" (Bronkhorst et al., 2011, p. 1125). The third design principle is 'require student teachers to draw on pupils as feedback', where pupils are seen as a rich source of feedback. The last design principle here is 'explicate teacher education pedagogies'. Teacher educators can ask students for example why they did certain things in their classes, which provides insight in the reasoning behind teaching.

The regulation conception of deliberate practice consists, according to Bronkhorst et al. (2011) of three design principles. First, 'teach about learning to teach', is about making student teachers aware of what is meant by learning to teach. It helps them to take on more responsibility in their own learning process. 'Support student teachers' creation of powerful learning context' is the second design principle, where students should be actively involved in organizing their own learning process. The third design principle is 'strive for student teachers' realistic professional development'. Hereby, it is important that the students develop themselves in a challenging but realistic way.

The results of this study where based on how both concepts can be stimulated in the teaching practice. It provides new insights in, for example, the conception of deliberate practice in the field of teacher education, where also pupil learning is taken into account. The present study will build further on these results with a new focus on how both concepts can be stimulated during student teachers' internship.

### 1.5 Context of this study

In the Netherlands, there are different teacher education programs. There are professional programs at applied universities which usually contain four years and prepare student teachers for teaching primary education or for teaching the lower classes of secondary education. The teacher education programs that prepare student teachers to teach the higher classes of secondary education are normally one-year-postgraduate programs at the university, which students follow after completion of a subject specific masters degree. Secondary school teacher education programs are, as opposed to primary education programs, subject-matter specific.

Data in this study will be obtained from students and their mentors from a one-year postgraduate teaching education program at the university. Like all one-year postgraduate teaching education programs, this teacher education institute provides a dual education program. In these dual learning programs, student teachers combine learning from studying at the university and learning from practice during their internship. For students of this teacher education institute, this means that they spend half of their studying time during their internship. The time of the student teachers in their practicing schools is therefore very important in their development as a teacher. To help student teachers in this development, they are guided during their internship by a mentor of the school and by a supervisor of the education institute.

### 1.6 Research questions

As described in the literature review above, deliberate practice and meaning-oriented learning promote student teachers' learning during and after pre-service teacher education. In this study will be investigated how both concepts can be stimulated during student teachers' internship. In line with the theory about scaffolding, the first research question is about the awareness of student teachers' learning orientations. It will provide an answer on how student teachers and their mentors diagnose the student teachers' learning orientation and to what extent this corresponds with the learning orientation measured by the Inventory Learning to Teach Process (ILTP). A good insight in these learning orientations should support the process of change to a more meaning-oriented way of learning. Although the theory of scaffolding focuses more on the adaptive support provided by mentors or more capable peers, this research also includes the awareness of the student itself. This extra dimension is incorporated in this study, because the focus lies on the development of adult students, who need to be able to guide their own development as well.

The second research question is based on the research of Bronkhorst et al. (2011), whereby twelve expert teacher educators were interviewed about how to stimulate both concepts at the teaching institute, which resulted in twelve design principles. In this study, thirteen expert mentors will be interviewed to gain information about their definition of both ways of learning and about their view on how meaning-oriented learning and deliberate practice can be stimulated within the teaching practice. This should give a more complete view about how both concepts can be stimulated in both learning environments of student teachers.

*Research question 1*

How are student teachers' learning orientations related to their mentors' and own perceptions of this?

*Sub questions*

- How do student teachers diagnose their own learning orientation and to what extent does this correspond with the learning orientations measured by the ILTP?

- How do student teachers' mentors diagnose their students' learning orientation and to what extent does this correspond with the learning orientation measured by the ILTP?

*Research question 2*
How can meaning-oriented learning and deliberate practice be defined in the context of learning to teach according to expert mentors and how can student teachers' meaning-oriented learning and deliberate practice be stimulated during their internship according to expert mentors?

*Sub questions*
- How can meaning-oriented learning be defined in the context of learning to teach according to expert mentors?
- How can student teachers' meaning-oriented learning be stimulated during their internship according to expert mentors?
- How can deliberate practice be defined in the context of learning to teach according to expert mentors?
- How can student teachers' deliberate practice be stimulated during their internship according to expert mentors?

# 2. Methodology

In this research study, there are different methods used to obtain sufficient data for answering both research questions. The design of the research questions will be explained with reference to the participants involved in the studies, the instruments used and the way the data is analyzed.

## 2.1 Study 1: Perceptions of the learning orientations by student teachers and their mentors

For answering the first research question, two types of data are obtained. First, the learning orientation of student teachers of a teacher education institute is measured by the Inventory Learning to Teach Process (ILTP), as designed by Oosterheert, Vermunt, and Denessen (2002). In this research method, the perception of the student teacher about their learning orientation is already included. In order to compare the learning orientation of the student teacher derived from the ILTP with the perceptions of the mentors on the learning orientation of their students, mentors are asked to fill in a short questionnaire about their perception on this. The participants included in this research, a description of the research methods used and the way of analyzing the data is set out below.

### 2.1.1 Participants

In this study, 81 students from a one-year postgraduate teaching education program and their personal mentors participated in the research. The students filled in the ILTP questionnaire, to find out what their learning orientation is and they diagnose their own learning orientation. The personal mentors of the student teachers were asked to fill in a short questionnaire about how they diagnose the learning orientation of their students. The 81 student teachers and the 36 personal mentors of the student teachers who did respond to this were included in this research.

### 2.1.2 Instruments

Student teachers' learning orientations are measured with the Inventory Learning to Teach Process (ILTP) (Oosterheert, Vermunt, & Denessen, 2002). Subsequently, the ILTP measures the perceptions of the student teachers about their own learning orientation. The ILTP consists of 52 items, divided in 10 different scales with Likert-type items. The first three scales concern comments about learning conceptions. Scales 4 t/m 8 consists of measuring the mental learning activities which students undertake in conjunction with the control of these activities. Scales 9 and 10 measures how students deal with negative teaching experiences. By using z-scores of the ten scales of the ILTP, the learning orientation which was the closest to the score pattern of the student teacher is calculated.

In order to measure how student teachers' personal mentors diagnose the student teachers' learning orientation, a short questionnaire is developed. This questionnaire contains four descriptions about the learning orientations student teachers can have, and is based on the questionnaire that is part of the ILTP. For the mentors, a small adjustment is made in the questionnaire: they only need to fill in the learning orientation of which they think it describes their student learning habits.

### 2.1.3 Analysis

To provide an overview of the data included in this study, a crosstab displays the learning orientations of all student teachers participated in the research according to the ILTP, compared with their own and their mentors' perceptions of these learning orientations. For measuring the extent both outcomes correspond with each other,

Kappa will be calculated. Subsequently, the wilcoxon signed-rank test is used for measuring the degree to which student teachers and their mentors over- or underestimate the students' learning orientation. The differences will be calculated and ranked, whereby the sign of the difference (positive or negative) is assigned to the rank. To be able to perform this test, first all variables are recoded into new variables, to make sure they are ranked from most desirable way of learning to the least desirable way of learning: (4) independent meaning-oriented learning; (3) dependent meaning-oriented learning; (2) reproduction oriented learning; and (1) survival oriented learning.

### 2.2 Study 2: Fostering meaning-oriented learning and deliberate practice

The main goal of the second research question is to generate knowledge about the way meaning-oriented learning and deliberate practice is defined by expert mentors, and the possible interventions which, according to them, can stimulate these ways of learning during the student teachers' internship. By conducting interviews, the expert mentors were able to give their perception on both topics. To obtain sufficient data, the mentors were purposefully selected and the way of interviewing and analyzing is chosen deliberately. This is explained more in detail below.

#### 2.2.1 Participants

For answering the research question, data is obtained from expert mentors of students from a one-year postgraduate teaching education program. The expert mentors are purposefully selected, based on the definition of an expert teacher educator, used in the study of Bronkhorst et al. (2011): the expert mentor has at least ten years experience as a mentor, and is recognized and put forward as an expert by the teaching practice schools and by employees the teacher education institute.

In this study, thirteen expert mentors from the teaching practice are selected. Because in general teachers from the teaching practice have less experience as a mentor than teacher educators, the selection criterion is adjusted to a minimum of five years experience. The expertise of the selected expert mentors is recognized by peers and supervisors and is considerate as outstanding. All expert mentors accompanied at the time of the interview a student or have done this in the year before.

Student teachers receive guidance during their internship from three mentors who supervise at different levels. All students have a personal mentor from the same subject, who guides them during their daily practice. In addition, they receive guidance from a more general mentor, who focuses more on the pedagogical skills and provides the education offered within the school. At the highest level, student teachers are supervised by a school mentor, who is responsible for all students in the school and has a more managing function. In this study, six personal mentors, three general mentors and two school mentors are interviewed. There are also two mentors interviewed who are both personal mentors and general mentors at the same time.

#### 2.2.2 Instrument

To obtain sufficient data for answering the second research question, open interviews were conducted with the expert mentors, as described above. In this way, expert mentors were able to give detailed perceptions on both topics. In this study, were the results are based on their perceptions and ideas, this method conforms to all the requirements. First, two pilot interviews were held to get used to the way of questioning and to experience how the responses of the expert mentors are.

The interviews are based on the interview scheme of Bronkhorst et al. (2011), and consists of an open interview scheme. By asking open questions, expert mentors have the opportunity to comprehensively give their perception on these complex topics, based on their expert knowledge. The interview consists of two parts: introduction of the topic and

ways of stimulating meaning-oriented learning and deliberate practice. In the introduction part, the two concepts were explained to the expert mentor. After the explanation, the expert mentors were asked to give their own definition to these concepts and to explain how they perceive these ways of learning by student teachers in the teaching practice. In the second part of the interview, expert mentors were asked to define ways to stimulate meaning-oriented learning and deliberate practice. Main questions, like "How can you stimulate student teachers to look for the underlying patterns and causes in their teaching?" and "How can you support student teachers to use their environment deliberately for their own development?", were asked during the interviews to let expert mentors explain the different interventions which in their perception can stimulate these ways of learning by student teachers. The interviews were conducted at the 'internship schools' where the experts work and took about one hour. They were audio taped and transcribed verbatim.

### 2.2.3 Analysis

The way of analyzing the data emerged from the interviews is partly based on the way of analyzing Bronkhorst et al. (2011) used in their study. For the first part, the codes for the conceptual understandings were in the beginning the same as the codes used by Bronkhorst et al. This top-down analysis is chosen, since no significant differences were expected in the conceptual understandings between teacher educators and expert mentors. The way of coding the second part of the interviews is, however, in the first instance only based on the responses of the expert mentors. Differences were expected in the kind of interventions named by the expert mentors, and this research is also conducted to see what the differences and similarities are in comparison with the interventions named by the teacher educators. Therefore, there is chosen for a bottom-up analysis of the second part of the interview. The bottom-up procedure has also led to a new dimension which is included in this research. Because of the open structure of the interview, expert mentors mentioned several pre-conditions for learning which are, according to them, very important to take into account.

For formulating the codes and analyzing the data based on these codes, the program Atlas.ti is used. In this program, the definitions and interventions named in the interviews can easily be linked to the matching codes. In a separate table, these codes along with the definitions and examples functioned as basis of the coding scheme. The analyzing of the interviews was iterated for at least three times, where after each iteration the code scheme was refined. Afterwards, two interviews were reanalyzed by two other students. With a match of 68% the coding scheme can be seen as quite reliable.

The codes derived from the interviews were transferred into design principles. In line with the research of Bronkhorst et al. (2011), the CIMO-logic is used in this process. This means that the design principles should specify the *context* to which they apply, the *intervention* itself, the *mechanism* which support the change of behavior into the desired *outcome*, which is in this case a meaning-oriented and deliberate way of learning. The context is not explained separately by the expert mentors, as all design principles are described so that they fit within the context of the internship. Therefore, the contextual part is not separately analyzed, like the other factors of the CIMO-logic.

In this study, the focus lies on the shared understanding of expert mentors about the conceptual understanding and the ways of stimulating meaning-oriented learning and deliberate practice by student teachers. This shared understanding entails, based on the way of analyzing of Bronkhorst et al. (2011), that the ways of stimulating meaning-oriented learning and deliberate practice in the teaching practice must be shared by at least half of the experts and contested by none. In the result section, only the design principles derived from this shared understanding of expert mentors are included.

# 3. Results

In the result section, the results of the ILTP questionnaire and the short questionnaire filled in by the mentors of the student teachers will be described. It provides an answer about the learning orientations of the student teachers involved in this research and their own and their mentors' perception about these learning orientations. Subsequently, an overview is given about the results derived from the interviews, which provide an answer on the second research question. It contains a description of the conceptual understandings of the expert mentors of meaning-oriented learning and deliberate practice, and their perception about ways to stimulate both concepts at student teachers in the teaching practice.

## 3.1 Perceptions of learning

The first study describes the learning orientations of the student teachers and their own and their mentors' perception about the students' learning orientations. The extent to which their diagnosis corresponds to the actual learning orientation of the student teacher measured by the ILTP is investigated. The results of this analysis will be described in the next paragraphs. First, an overview of the data is given in a crosstab, which compares the actual learning orientation with the perceptions of the student teachers and their mentors. Then, the degree of over- or underestimating the learning orientations by the student teachers themselves and by their mentors will be presented, based on the wilcoxon signed-rank test.

### 3.1.1 Learning orientations of the student teachers and their perceptions

81 student teachers participated in this study. Of these students, 42 have a meaning-oriented way of learning. A distinction can be made between dependent meaning-oriented learning (18 students) and independent meaning-oriented learning (24 students). 19 students have a reproduction-oriented way of learning and there are 20 survival-oriented students.

As represented in table 3, 44 students indicate that a meaning-oriented way of learning suits them, where, according to the ILTP, 42 students have a meaning-oriented way of learning. Survival-oriented students, however, find it harder to estimate which learning orientation fits the best. Only 5 student teachers think this learning orientation suits them, where according to the ILTP there are 20 survival-oriented students. The agreement between the learning orientations derived from the ILTP and student teachers' diagnosis about their own learning orientation was found to be Kappa = 0.147 ($p$ = 0.017 ), which can be seen as only a slight agreement between the findings.

**Table 1**
*Student teachers' learning orientations and according to the ILTP and their own diagnosis*

| | | Diagnosis student teachers | | | | |
|---|---|---|---|---|---|---|
| | | **Independent meaning-oriented learning** | **Dependent meaning-oriented learning** | **Reproduction-oriented learning** | **Survival-oriented learning** | **Total** |
| ILTP | Independent meaning-oriented learning | 9 | 7 | 6 | 2 | 24 |
| | Dependent meaning-oriented learning | 4 | 7 | 7 | 0 | 18 |
| | Reproduction oriented learning | 2 | 5 | 11 | 1 | 19 |
| | Survival oriented learning | 6 | 4 | 8 | 2 | 20 |
| | Total | 21 | 23 | 32 | 5 | 81 |

While there is only a slight agreement between the scores of the ILTP and the diagnosis of the student teachers, the wilcoxon signed-rank test is used to measure if student teachers significantly over- or underestimate their own learning orientation in comparison to the ILTP. As shown in table 2, 29 student teachers estimated their learning orientation in accordance to the ILTP, 23 student teachers made a more negative estimation and 29 students a higher estimation. The degree of over- or underestimating is however not significant, $z = -1.066$, $p = 0.286$.

**Table 2**
*Extent of student teachers' over- and underestimating their own learning orientation*

| | | N |
|---|---|---|
| Perception student teachers - ILTP | Negative Ranks | 23 |
| | Positive Ranks | 29 |
| | Ties | 29 |
| | Total | 81 |

### 3.1.2 Perceptions of mentors about the learning orientation of their students

In this study, 36 mentors participate and gave their perception about the learning orientation of the student they guide. Of these 36 students, 18 students have a meaning-oriented way of learning according to the ILTP. The diagnosis of their mentors resulted in a much higher score of 29 meaning-oriented students, as shown in table 3. Next to this, 10 student teachers have a reproduction oriented way of learning, and there are 8 survival oriented students. According to the mentors, there are only 5 reproduction-oriented and 2 survival-oriented students. Probably because of the small number of participants, a Kappa test doesn't provide a significant answer about how the ILTP stands in relation to the perception of the mentors about their student teachers' learning orientation: Kappa = -0.018 ($p = 0.884$).

**Table 3**
*Student teachers' learning orientation according to the ILTP and the student teachers' mentors*

| | | Diagnosis student teachers' mentors | | | | |
|---|---|---|---|---|---|---|
| | | **Independent meaning-oriented learning** | **Dependent meaning-oriented learning** | **Reproduction-oriented learning** | **Survival-oriented learning** | **Total** |
| ILTP | Independent meaning-oriented learning | 6 | 3 | 1 | 1 | 11 |
| | Dependent meaning-oriented learning | 5 | 1 | 1 | 0 | 7 |
| | Reproduction oriented learning | 4 | 3 | 2 | 1 | 10 |
| | Survival oriented learning | 3 | 4 | 1 | 0 | 8 |
| | Total | 18 | 11 | 5 | 2 | 36 |

According to the information presented in the crosstab in table 3, it can be expected that mentors overestimate the learning-orientation of their students in comparison with the ILTP. As shown in table 4, 20 mentors overestimate the learning orientation of their student against only 9 negative estimates. The mentors therefore significant overestimate the learning orientation of their students, $z = -2.627$, $p = 0.009$

**Table 4**
The extent of mentors' over- or underestimating the learning orientation of their students

| | | N |
|---|---|---|
| Perception SPD - ILTP | Negative Ranks | 7 |
| | Positive Ranks | 20 |
| | Ties | 9 |
| | Total | 36 |

### 3.2 Conceptual understandings

Expert mentors were asked during the interviews to define meaning-oriented learning and deliberate practice in learning during internships. At first, the assumption was that their definitions would be consistent with the descriptions of the teacher educators in the study of Bronkhorst et al. (2011). In this top-down approach, the codes were initially made the same, after which it was examined if it turned out to be the correct code.

The final results of this analysis are presented in the next paragraphs. The definitions of the expert mentors are summarized into codes and are illustrated with a quotation of an expert mentor derived from the interviews. These codes are compared with the results of the study of Bronkhorst et al. (2011), were at meaning-oriented learning small a small adjustment is made.

#### 3.2.1 Meaning-oriented learning

12 of the 13 expert mentors included in this research gave their definition on meaning-oriented learning. Most definitions mentioned by the expert mentors correspond to the definitions named by the teacher educators in the research of Bronkhorst et al. (2011). In their study, meaning-oriented learning is defined by the teacher educators as "learning for more than the immediate context" or "going beyond what works" (p. 1123 and 1124). In this study, this is described as 'constantly looking at the underlying causes and patterns of teaching', and is mentioned by 10 expert mentors. By reflections and posing why-questions, student teachers give meaning to their learning. As expert 7 defines:

*"They have much better in their system to continue to reflect, to be more results-oriented in their work and to look at what the student actually does. Did the student learn what I hoped he would have learn, and where didn't it work out, and what is my role in this, how can I continue to do that, and what does the theory says about it, which alternatives does it provides. If that's in your system, you keep learning…"*

In addition to this, two expert mentors from the group above named, next to this insight in the underlying causes and patterns of teaching, insight into the broader context of the teaching practice as an important part of meaning-oriented learning. According to them, student teachers need to become aware of all aspects of the teaching practice in order to give meaning to their learning. Two other expert mentors defined meaning-oriented learning as continuously improve themselves. One expert mentor didn't give a specific definition during the interview.

10 expert mentors mentioned that most students start with survival-oriented learning, where they only think about the next lesson they need to give. As they become more experienced, most students start to look beyond the teaching context and focusing more on the reasoning behind their teaching and how they can improve their own performance.

#### 3.2.2 Deliberate practice

Consistent with the results of Bronkhorst et al. (2011), there is a distinction made by 11 of the 13 expert mentors in the definition of deliberate practice. Because the codes used in the study of Bronkhorst et al. cover the way of defining deliberate practice by expert mentors, these codes are also incorporated in this study. The two remaining expert mentors didn't specify their definition enough during the interview and are therefore not included in the research.

5 expert mentors defined deliberate practice as, what is called by Bronkhorst et al. (2011), the 'enactment conceptualization of deliberate practice'. This indicates that student teachers want to improve their performance and become a good teacher to benefit pupil learning. As expert mentor 13 explained:

*"Let's say the ideal goal of every student should be the same as the goal of every motivated teacher, namely the fact that you want to help pupils in an important phase of their life a bit further."*

The other definition of Bronkhorst et al. (2011), the 'regulation conceptualization of deliberate practice', is named by 6 expert mentors. This means that the student creates their own instructive learning environment, which allows them to improve their performance in an optimal way. As described by expert mentor 10:

*"For example, they necessarily want that the things they are not proficient in yet, that you help them to improve their performance at those points."*

In this example, the student is making his own practice more educative by making use of his mentor to improve his performance. From this perspective, students reflect more on their own performance, looking for things and ways to develop themselves optimally.

### 3.3 Preconditions of learning

An additional section in this study in comparison with the study of Bronkhorst et al. (2011), are the preconditions of learning mentioned by the expert mentors. These preconditions, influencing the degree of changeability of the learning orientation of student teachers, can be divided in personal characteristics and environmental characteristics. Based on these two factors, these preconditions will be set out below along with some quotations derived from the interviews.

Personal characteristics of the student teachers are named by 5 expert mentors as a precondition for learning in this specific way. In their opinion, student teachers need to have a kind of basis, a certain personality and capability, in order to be able to change their learning style within one year of education. Next to this, student teachers need to be motivated to change their way of learning and to make use of all kinds of support offered from the educational institute and by their mentors within their teaching practice.

Within the learning context, several preconditions are mentioned by the expert mentors. First, the length of the teaching program at the teaching institute is named by 5 expert mentors. They argue that one year is too short and the study program too heavy in order to change the learning style of the student teachers.

Another precondition for learning mentioned by 8 expert mentors is the relation between the mentor and the student. The mentor should be committed to the student and there need to be a basis of trust and safety, before learning can take place. As mentor 12 describes:

*"If there is no 'click' between the mentor and the student, or the mentor has a way of encouraging which doesn't fit the student, well yes, than the shift to more meaning-oriented learning can be more slowly or sometimes doesn't take place at all."*

The learning environment of the internship is, according to 10 expert mentors, also a precondition of learning. When there is a learning culture, where it's safe and normal to ask for feedback and to help each other in their development, student teachers are more stimulated to develop them in a meaning-oriented and deliberate way. The learning environment also needs to support learning, which may imply that, for example, students change classes to make a new start when it went wrong in the first period.

The last precondition for learning mentioned by 7 expert mentors is the capacity of the mentor. The mentor must be trained in order to guide the student in the right way.

By using good interviewing techniques and having enough experience and knowledge, the mentor can have an important role in the way the student develops.

Keeping all these preconditions for learning in mind, only three expert mentors do believe that all student teachers are capable of changing their way of learning within one year. All other mentors think that most students, but not all, can change their way of learning into the desired learning orientations. These opinions are based on the preconditions described above, which can make it more difficult for student teachers to change.

### 3.4 Design principles for meaning-oriented learning

Meaning-oriented learning is a way of learning which is preferred over other ways of learning. Expert mentors were asked how they can stimulate student teachers to learn and develop themselves in a meaning-oriented way. This resulted in 5 design principles and several possible interventions, which are described below. Design principles named by at least half of the expert mentors and contested by none are included in this result section. They are described with reference to the design principle, possible interventions, the mechanisms and the desired outcomes. All design principles are illustrated by quotations derived from the interviews. A complete overview of this is shown in table 5.

**Table 5**
*Design principles for meaning-oriented learning: interventions, mechanisms and desired outcomes according to expert mentors*

| Design principles | Possible interventions | Triggers the following mechanism(s) | Generating desired outcome(s) |
|---|---|---|---|
| Critical analysis of the student teachers' practice | Video analysis; zooming in on competencies; receive feedback from different perspectives; asking the right questions | Student teachers learn to reflect on their teaching practice and their actions | Invites student teachers to use reflections to improve their performance and to monitor their own development |
| Look at the underlying processes of teaching and learning | Observe lessons to look at causes and effects; posing in-depth questions; discuss with other students (peer group) | Identifies underlying patterns and causes in teaching | Enables the transfer of gained knowledge to other teaching situations |
| Include diverging perspectives | Receive feedback of their mentor, colleagues and peers; observe lessons by deliberately chosen teachers; following classes | Creates awareness of other perspectives on teaching | Invites student teachers to consider multiple perspectives on their own teaching and it broadens the reference framework of student teachers |
| Support student teachers to make the connection between theory and practice | Thematic meetings; guidance from the teaching institute and the educator in school; making use of sources like books and internet | Identifies underlying patterns and causes in teaching from a theoretical view | Broadens the reference framework of the students, and give them a deeper insight in the underlying principles of the teaching practice |
| Look beyond the teaching practice | Participation in extracurricular activities, meetings and projects; look at other lessons pupils come from | Student teachers become aware of all aspects of the teaching practice | The overall knowledge enables student teachers to behave and act like a teacher and broadens their view on the pupils they teach |

#### 3.4.1 Critical analysis of the student teachers' practice

Critical analysis of student teachers' practice is mentioned by 11 of the 13 expert mentors as a way of stimulating meaning-oriented learning. The expert mentors named several ways for student teachers to analyze their practice. One way is described by expert 12 as:

*"Or with video's, which always works very well. What did you do, and how did it feel, and what was the effect on yourself and on your students?"*

Next to video analysis, student teachers can, according to several expert mentors, use their mentors, colleagues, other students, and the pupils they teach, in order to receive feedback on their practice. By posing the right questions, student teachers' mentors can also help student teachers to reflect on their own performance. Another tool

is the use of competency cards, which enables students to make their competences more concrete and provides insights in their level of performance.

When using this kind of interventions, student teachers are triggered to reflect on their teaching practice and their actions. It helps student teachers to receive a deeper insight in the way they teach and how they behave and act during their internship. Student teachers can use these reflections to improve their performance, but also to monitor their own development.

### 3.4.2 Look at the underlying processes of teaching and learning

Student teachers need to look at the underlying processes of teaching and learning, according to 12 expert mentors. As shown in table 5, it triggers the mechanism of identifying the underlying patterns and causes in teaching, which invites student teachers to rethink their assumptions about teaching and to broaden their reference framework. This can help student teachers to transfer their knowledge to other teaching situations.

Possible interventions to realize this are by posing why-questions or other in-depth questions, described by expert mentor 3 as:

*"Here it went well, why did you succeed here? And what was the reason that pupils did participate here?"*

Student teachers can also observe lessons of their colleagues, where they can look at causes and effects, like the influence of the actions of the teacher on the behavior of the pupils. They can also discuss with peers during peer meetings, to gain deeper insights in the underlying causes and patterns of teaching.

### 3.4.3 Include diverging perspectives

All expert mentors indicated that it is important to include diverging perspectives. Student teachers can make use of their mentors, colleagues, and peers to look at different teaching methods. They can discuss with them about these practices, or receive feedback from their perspective on their own performance. By following classes or deliberate choose certain practices, student teachers can observe the different teaching methods which can be used. At the end, they need to develop their own teaching style by choosing the ways of teaching which suit them. These possible interventions are displayed in table 5.

Especially in the beginning, mentors and colleagues can help student teachers to look at possible ways to construct their lessons. It helps student teachers to become aware of other perspectives on teaching, which enables them to consider multiple perspectives on their own teaching. It also helps student teachers to create a knowledge base for the first period. Expert mentor 13 describes it as follow:

*"But in our school, all these stones are the pupils. And when they all fall down, we have lots of pupils who failed. That is not agreeable, so there need to be sort of a basis on which you can trust, and that basis is prompted by their mentor. And that is the survival oriented phase, and I think that that is okay. The disadvantage is that you receive a style which maybe doesn't suit you. But then, you need to find your own style in the second half of the school year or the coming three till five years.*

### 3.4.4 Support student teachers to make the connection between theory and practice

One important aspect of meaning-oriented learning is the ability of the student to make the connection between the theory and their teaching practice. 11 of the 13 expert mentors indicated that it is important to guide student teachers in making this

connection. The educator in the school and teachers from the teaching institute need to provide this theory to student teachers and they have the main task to help them to make the connection with the teaching practice. As expert mentor 3 formulates:

*"They are taught by someone of the ILS [teaching institute] from the theoretical background and from someone from practice […] as educator in the school. And those two take care that there is made a connection between theory and practice, and therefore give meaning."*

The educator in the school can offer the theory during thematic meetings, which need to be close related to the teaching practice and should be delivered at 'the right time'. This makes it easier to make the connection. During meetings, they also can ask student teachers how they use the theory in their teaching practice, something which can also be done by their workplace supervisor. Next to this, student teachers can use other sources, like for example books and internet, to broaden their reference framework.

By support student teachers in making this connection, they are more able to identify the underlying principles from a theoretical perspective. It provides student teachers a deeper insight in the underlying principles and it helps them to broaden their reference framework.

### 3.4.5 Look beyond the teaching practice

Knowledge about teaching pupils is not enough in order to become a good teacher and learn in a meaning-oriented way. According to 8 of the expert mentors, student teachers need to become aware of everything the teaching practice entails. As defined by expert mentor 13:

*"And I think that students there, interns, receive a very good insight in that the pupil in a classroom or in a lesson is not always what it is, but that there is a lot behind it and the student doesn't just react like that. And I think that's a good example of making connections and meaning-oriented learning."*

Possible interventions mentioned during the interviews are for student teachers to participate in extracurricular activities and report meetings, parent meetings, etcetera, and participation in school projects. It can also be helpful to look at other practices, to overlook from what situations pupils come before they reach their lesson.

This overall knowledge helps student teachers to become aware of all aspects of the teaching practice. It should help student teachers to take on a teacher attitude, and should give them more insight in the pupils they teach. It also helps them to see the coherence in the school between for example teaching, report meetings, parent meetings, and the vision of the school.

## 3.5 Design principles for deliberate practice

Deliberate practice is the second desirable way of learning which is included in this research. Expert mentors gave their opinion about how they would stimulate the deliberate learning orientation of the student teachers within the teaching practice. This also resulted in 5 design principles, which are described below in the same way: design principle, possible interventions, mechanisms and desired outcomes, illustrated by quotations of the expert mentors. Table 6 provides an overview of these results.

**Table 6**
*Design principles for meaning-oriented learning: interventions, mechanisms and desired outcomes according to expert mentors*

| Design principles | Possible interventions | Triggers the following mechanism(s) | Generating desired outcome(s) |
|---|---|---|---|
| Critical analysis of the student teachers' practice | Posing the right questions; video analysis; asking feedback from pupils, colleagues, and peers | Student teachers learn to reflect on their teaching practice and their actions | Student teachers can use their reflections as a starting point for their development or to check if they have reached their goal. |
| Look at the underlying principles | Posing in-depth questions; look at different practices. | Identifies underlying patterns and causes in teaching | Enables student teachers to deliberately choose for a certain way of teaching |
| Include diverging perspectives | Receive feedback of their mentor, colleagues and peers; observe lessons by deliberately chosen teachers | Creates awareness of other perspectives on teaching | It broadens the reference framework of student teachers, which enables them to consider different ways to reach their goal |
| Strive for student teachers' realistic professional development | Posing the right questions; competency cards; space for making mistakes | Student teachers learn to set realistic goals for themselves | Invites student teachers to develop themselves in a realistic way |
| Creating a powerful learning environment | Learning culture; planned feedback moments; actively asking for feedback and make use of all opportunities at the school | Creates a learning culture where it is more easy and common to develop | Invites student teachers to develop themselves, making use of their environment |

### 3.5.1 Critical analysis of student teachers' practice

12 expert mentors mentioned the importance of critical analysis of the student teachers' practice. An important aspect is making the situation concrete, as expert mentor 11 describes:
*"What are the students doing, what are the pupils doing, and what do you want at that moment? What do you say, what is your attitude/ position? Do you clung your book, do you stand to wobble on your legs? Literally how do you stand, and you walk around and… Yes, we imagine that sometimes literally to the student."*

As the quotation indicates, mentors can help the students during conversations to make the situation concrete by posing w-questions like: what, when, who, where. Video analysis can also help in this case. Next to this, student teachers can ask the pupils they teach or colleagues and peers to reflect on their practice.

By making use of these interventions, student it triggers the mechanism of reflection on student teachers' own teaching practice and actions. This reflection can be used by the student teachers to find out what the starting point in their development is and which aspects they need to improve. These reflections can, according to the expert mentors, also be used to check if they have reached the goal they set for themselves.

### 3.5.2 Look at the underlying principles

Look at the underlying principles is by 10 expert mentors seen as an important element of deliberate practice. As set out in table 6, student teachers need to become aware of the underlying patterns and causes (mechanism), which enables them to deliberately choose for certain actions and teaching method (desired outcome). As mentioned by expert mentor 7:

*"But especially good feedback about what went well and why it went well and what is the underlying principle and what does the theory says about it. I keep saying that, when you have a feedback moment every time, someone increasingly come into the awareness of that learning. And then, learning becomes more deliberate. […] So for everything is a phase and a choice, but if you know you have that choice, you can make it deliberately."*

Several possible interventions are mentioned by the expert mentors during the interviews, to stimulate a more deliberate way of learning of the student teachers. During conversations, mentors can ask the student teachers in-depth questions, in order to let them think actively about the underlying principles in their teaching. Student

teachers can also look at different practices with their colleagues, to discover what the effect is of certain behaviors or the environment on the pupils they teach.

### 3.5.3 Include diverging perspectives

In the teaching practice, there are a lot of different ways of teaching to distinguish. According to 10 expert mentors, student teachers need to become aware of these different practices. During their internship, the students should have the opportunity to view multiple practices and learn about multiple perspectives on teaching. This is described by expert 8 as:

*"In principle to such a person as varied as possible to rotate in training. So that he does his internship not just with me, but at the school itself. Not just with the biologists, but also with other courses to see how it works there. That doesn't say that you run your lessons there, but by looking to multiple perspectives, you can improve your own learning style enormously."*

Student teachers can look at different perspectives by, as described above, observe lessons of their colleagues of other subjects, but they can also look for educational principles of other countries. Mentors can help the students to think during conversations about different ways of teaching and alternatives to reach a certain goal. Student teachers can use their mentor, but also colleagues and peers, to discuss about these diverging ways of teaching, in order to find their own teaching style.

These possible interventions, as shown in table 6, can trigger student teachers' awareness of other perspectives on teaching. It broadens their frame of reference, which enables them to consider different ways of teaching in order to reach the goal they have set for themselves.

### 3.5.4 Strive for student teachers' realistic professional development

12 of the 13 expert mentors mentioned the importance of the realistic development of student teachers. Realistic development means, according to the mentors, that the goals of the students are concrete and consistent with the SMART model: specific, measurable, attainable, relevant, and time-bound. Next to this, student teachers need to focus on one or a few components of teaching, which can be translated into sub goals. Several interventions can be used to support student teachers to set realistic goals for themselves, to ensure their realistic development.

Mentors can help the student teachers to make their goals concrete and can help them to really think about what the goal entails. As expert mentor 2 stated:

*"It needs to be clear which goals they set for themselves. So it should also be visible, and he needs to write it down. And then I ask questions about it. What exactly do you mean with this? I want a safe learning environment. What is safe for you? What is a safe learning environment for you? When is it safe? Is there no shooting going on or…? Yes, that is silly, but what is a safe learning environment for you? When it is safe? Is it always safe?"*

By posing the right questions, like the example above, mentors can help the student teachers to set the right goals for themselves. Competency cards can also help them to set realistic goals and to show them what is realistic in each development phase. In order to achieve their goals, student teachers need to prepare themselves very well and there need to be some space for making mistakes.

### 3.5.5 Creating a powerful learning environment

The learning environment can, according to several expert mentors, help student teachers to develop a deliberate way of learning. First, the environment of the school itself can have a big impact. When there is a learning culture, where teachers ask for feedback and trying to develop, it triggers, according to the expert mentors, student teachers take over this way of developing and use their environment to improve their performance, as is described as the mechanism and desired outcome in table 6.

Mentors can also stimulate this way of learning to plan feedback moment at a fixed time every week, to keep focusing on the development of the student. At least, student teachers can make use of their environment by actively asking for feedback and to assist colleagues with projects and trainings offered at the school. Expert mentor 8 explained this with the following example:

*"There are students in the past few years I barely saw in the last months. I therefore don't feel called to stay here, because I knew it went well. I noticed that they used other colleagues much more than they used me. Well, fine, because you also need to do that in the next job."*

# 4. Conclusion and discussion

Deliberate practice and meaning-oriented learning are two ways of learning that contribute to continuous professional development of student teachers. This is important for their development after finishing the teacher educational program, in which it is necessary to face the continuous changes of the teaching practice. The results are described based on two research questions: (1) how student teachers and their mentors diagnose the student teachers' learning orientation and to what extent corresponds this to the ILTP outcomes, and (2) the expert mentors' conceptual understandings of both ways of learning and their view on how to stimulate this within the teaching practice. The conclusions are described below and provide an answer to both questions.

## 4.1 Diagnosing student teachers' learning orientation

In line with the theory of scaffolding (J van de Pol, 2012), student teachers and their mentors should be able to diagnose the learning orientation of the students. It contains the first two steps in providing adaptive support to, in this case, guide students to a more meaning-oriented and deliberate learning behavior. Research in this study shows, however, that student teachers and their mentors are not really capable of diagnosing students' learning orientation in a way that corresponds with the ILTP. Student teachers' perception of their own learning orientation only slightly corresponds to the findings of the ILTP. However, they don't over- or underestimate their own learning orientation significantly. The student teachers' mentors also diagnose the learning orientation of their students in a way that doesn't correspond to the ILTP. The agreement between their diagnosis and the ILTP couldn't be measured, probably because of the small number of participants. However, we can conclude that the mentors significantly overestimate their student teachers' learning orientation.

These differences might be due to the way of calculating learning orientations with the ILTP instrument. The z-scores indicate which learning orientation is the closest to the score pattern of the student teacher. Measuring with such a coarse size means that differences might occur when measuring it with another instrument. However, other studies which made use of the ILTP or other instruments for measuring the learning orientation of student teachers (e.g. Donche & Van Petegem, 2008; Endedijk et al., 2013), showed corresponding results with the learning orientations measured by the ILTP in this study. Based on these previous findings, we tend to conclude that the numbers of meaning-oriented students diagnosed by especially the student teachers' mentors (81%) isn't realistic, and that student teachers and their mentors have difficulty in properly diagnosing the student teachers' learning orientation.

The results of this study imply that the way of diagnosing the learning orientation of student teachers by themselves and by their mentors needs to be improved. This isn't only necessary for fostering meaning-oriented learning and deliberate practice. Because meaning-oriented learning encompasses most elements of the competency reflection and development, which is one of the seven competencies student teachers need to achieve, it is also questionable if student teachers' mentors are able to give a properly assessment in this. Therefore, properly diagnosing student teachers' learning orientation could help mentors also to assess this competency, which is important for maintaining the quality of the teacher education. Improving the way of diagnosing the learning orientation can therefore be seen as the first step in improving the quality of the teacher education and in fostering student teachers' meaning-oriented learning and deliberate practice.

## 4.2 Experts' conceptual understanding

Meaning-oriented learning is defined by the expert mentors as 'constantly looking at the underlying causes in patterns of teaching', which corresponds to the definition given by

the expert teacher educators in the study of Bronkhorst et al. (2011) and to the theoretical definitions about meaning-oriented learning (e.g. Oosterheert, Vermunt, & Denessen, 2002; Oosterheert, Vermunt, & Veenstra, 2002). In addition, insight in the broader context of the teaching practice is also named in the definitions of some of the expert mentors. This may be due to a probably more practical view on these concepts by expert mentors in comparison to the teacher educators. In learning during internships, a broad frame of reference should, according to the expert mentors, enable student teachers to make the connection between theory and practice. This finding is in line with how this is described in theory (e.g. Oosterheert & Vermunt, 2001), also referred to as the 'theory-practice gap'. Next to this, the expert mentors support the theory about the direction the change of learning orientation occurs (e.g. Donche & Van Petegem, 2008; Endedijk et al., 2013), by mentioning that student teachers mostly start with a survival-oriented way of learning, after which, during the year, they develop a more meaning-oriented way of learning. In defining deliberate practice, the same distinction is made as in the study of Bronkhorst et al. (2011): the 'enactment conceptualization of deliberate practice' and the 'regulation conceptualization of deliberate practice'.

### 4.3 Preconditions of learning

An additional component in this study is the preconditions of learning. Expert mentors mentioned during the interviews several aspects which can, according to them, be seen as preconditions of learning. Consistent with the theory (e.g. Vermunt & Endedijk, 2011), the expert mentors named personal and contextual characteristics influencing the degree of changeability of the learning orientation of student teachers. The personal characteristics include the personality, capability and the motivation of the student teachers. In line with the theory, the expert mentors state that student teachers need to have a kind of basic personality and capability to be able to change (Kamarulzaman, 2012), and they need to be motivated to make use of all sources and supports to obtain a meaning-oriented learning orientation (Deci & Ryan, 2000; Gagné & Deci, 2005; Mankin, 2009).

A contextual precondition named by the expert mentors is the educational program, which is according to the expert mentors too heavy and too short to change the learning orientation of student teachers. Several longitudinal studies showed that learning orientations can change over time, but this doesn't apply for all students and this may take longer than one year (e.g. Endedijk et al., 2013). The theory of deliberate practice is also based on improving performance during several years (Ericsson et al., 1993). This means that it might be unrealistic to think all students have within one year a meaning-oriented learning orientation and are able to deliberately improving their performance, but they can develop the skills and knowledge needed to be able to perform this further in practice after their teacher education. The learning environment itself is also mentioned by the expert mentors as a precondition, which need, in line with the theory, to be safe and supporting (Swanson & Holton, 2009). Next to this, the relation between the mentor and the student need, according to the expert mentors to have a basis of trust and safety and the mentor should be qualified in guiding student teachers. This is described by Hennissen, Crasborn, Brouwer, Korthagen, and Bergen (2011) as emotional support, like showing attentive behavior and showing genuineness, and task assistance, like asking for concreteness and giving advice and information.

Taken all these preconditions into account, not all student teachers are, according to the expert mentors, in the end capable of changing their way of learning within one year. The teacher education can optimize the contextual characteristics which support student learning, but have less influence on the personal characteristics. Next to this, the teacher education should ideally last longer than one year, to guide students in this process to a more meaning-oriented and deliberate way of learning. Because this could

be difficult to achieve, induction programs can help student teachers to continue the process they started in the teacher education. If certain essential characteristics are included, induction programs can be relevant for beginning teachers' professional development (Kessels, 2010)

### 4.4 Design principles

During interviews, all expert mentors that participated in this study gave their opinion about how to stimulate deliberate practice and meaning-oriented learning within the teaching practice. This resulted in 10 design principles, which are displayed in table 5 and 6. Three design principles are formulated the same for fostering meaning-oriented learning and deliberate practice: include diverging perspectives, look at the underlying processes of teaching and learning, and critical analysis of the student teachers' practice. Because both ways of learning are related, the same design principle can be used to guide students during their internship. However, the focus when using it for stimulating meaning-oriented learning is slightly different when using it for stimulating deliberate practice, as showed in the result section. In practice this means that student teachers' meaning-oriented learning and deliberate practice can be stimulated by using, in some cases, the same interventions but with a dual focus. This could make it easier and more timesaving for mentors to guide the student teachers to these ways of learning.

Next to this, a comparison is made between the results of this study and the results of the study of Bronkhorst et al. (2011), as showed in table 7 and 8. This provides the teacher education a more complete view how to stimulate both ways of learning within the teacher education institute and during student teachers' internships. Because of the different practices, there are only two design principles which fully correspond to each other. The other design principles have mostly a slightly different focus. The teacher education can use this in instructing mentors in the teaching practice and teacher educators at the teaching institute in different ways. However, the differences might also be used to, when possible, complement the design principles of this study as well as the design principles of the study of Bronkhorst et al. An overview and further description of the comparison between the studies is set out below.

#### 4.4.1 Design principles meaning-oriented learning

**Table 7**
*A comparison between the design principles for meaning-oriented learning of this study and the study of Bronkhorst et al. (2011)*

| Design principles of this study | Design principles of the study of Bronkhorst et al. (2011) | Degree of agreement |
|---|---|---|
| Include diverging perspectives | Include diverging perspectives | Full agreement |
| Look at the underlying processes of teaching and learning | Challenge student teachers' assumptions<br>Decontextualize student teachers' practice | Partial agreement |
| Critical analysis of the student teachers' practice | Decontextualize student teachers' practice | Partial agreement |
| Support student teachers to make the connection between theory and practice | Require student teachers to study pupil learning | Partial agreement |
| Look beyond the teaching practice | | No agreement |
| | Modeling meaning-oriented learning | No agreement |

*Include diverging perspectives* is the only design principle which fully corresponds to the equally named design principle derived from the study of Bronkhorst et al. (2011). By looking at other practices and other perspectives on teaching, student teachers broaden their reference framework which they can use in their teaching. Student teachers' mentors can support them in finding and choosing alternatives (Hennissen et al., 2011), which helps them to become 'thoughtful teachers' (Fairbanks et al., 2010), and can be seen as an important element of meaning-oriented learning (Oosterheert, Vermunt, & Denessen, 2002).

*Look at the underlying processes of teaching and learning* focuses on a broad context and includes elements as observing causes and effects, This design principle contain elements of two design principles from the study of Bronkhorst et al. (2011) as shown in

table 7. Challenge student teachers' assumptions invites student teachers to rethink their assumptions about teaching, but it is more ad hoc knowledge, which doesn't focus on identifying underlying patterns of teaching. Decontextualize student teachers' practice is also partially related to this design principle, while it identifies underlying patterns and causes of student teachers' practice. However, it doesn't fully embrace the design principle in this study, while elements like observing lessons to look at causes and effects and discussing with peers aren't included. *Critical analysis of the student teachers' practice* is also partially related to this design principle formulated by Bronkhorst et al., but focuses only on reflecting on their own performance, instead of looking at underlying causes and patterns. Critical reflection is seen as an important aspect of learning, whereby practitioners constantly looking for ways to improve their teaching expertise (Anderson & Herr, 1999; Conway & Clark, 2003; Evans, 2011). It doesn't fully embrace the concept meaning-oriented learning, but it is, according to the expert mentors, a necessary first step for student teachers to improve their performance and they can use it to monitor their own development. These different ways of formulating provides a more distinct view on how to stimulate meaning-oriented learning during student teachers' internship.

*Support student teachers to make the connection between theory and practice* contains support in a wide range of topics, whereby the design principle require student teachers to study pupil learning of the study of Bronkhorst et al. (2011) only takes in a small place. The expert mentors might have named this design principle, because in their internship schools this kind of support is already given to the student teachers. A close cooperation between the schools and the teaching institute is necessary to support student teachers in making this connection between theory and practice (Korthagen & Kessels, 1999).

*Look beyond the teaching practice* is, as shown in table 7, the only design principle which doesn't contains elements of the design principles described by Bronkhorst et al. (2011), which is probably caused by the different contexts both studies did take place. For fostering meaning-oriented learning during student teachers' internship, different sources can be used when meaning-oriented learning needs to be fostered within the teacher education context. On the other side, the design principle modeling meaning oriented learning from the study of Bronkhorst et al. doesn't appear in this study. This might be due to the role of the expert mentors, which is already a more modeling role (e.g. Hennissen, Crasborn, Brouwer, Korthagen, & Bergen, 2008) and therefore can be seen as more common instead as an intervention contributing to student teachers' way of learning.

### 4.4.2 Design principles deliberate practice

**Table 8**
A *comparison between the design principles for deliberate practice of this study and the study of Bronkhorst et al. (2011)*

| Design principles of this study | Design principles of the study of Bronkhorst et al. (2011) | Degree of agreement |
|---|---|---|
| Strive for student teachers' realistic professional development | Strive for student teachers' realistic professional development | Full agreement |
| Critical analysis of the student teachers' practice | working from student teachers' explicated theories of practice | Partial agreement |
| Look at the underlying processes of teaching and learning | promote anticipatory reflection<br>Explicate teacher education practices | Partial agreement |
| Creating a powerful learning environment | Require student teacher to draw on pupils as feedback<br>Support student teachers' creation of powerful learning context<br>Teach about learning to teach. | Partial agreement |
| Include diverging perspectives | Teach about learning to teach | Partial agreement |

*Strive for student teachers' realistic professional development* is the same as in the study of Bronkhorst et al. (2011) and need to make sure that student teachers set realistic goals for themselves. In contrast with deliberate practice within music and sports

(Ericsson et al., 1993), a goal for student teachers can have a dual focus: improve their own performance or improve the performance of the pupils they teach. According to Dunn and Shriner (1999), these ways of improving performance are related, but the information used to judge if student teachers reached their goal is different.

*Critical analysis of the student teachers' practice* largely encompasses the design principle working from student teachers' explicated theories of practice from the study of Bronkhorst et al. (2011), as displayed in table 8. The design principle used in this study focuses more on the actual performance in the teaching practice, while the design principle used by Bronkhost et al. is about explicating student teachers' frame of reference. However, both design principles can be used to find out their starting point for their development and to monitor their learning gains, which both are important elements in deliberate practice (Ericsson et al., 1993). Helping students to make this explicit and asking for concreteness are considered to be mentoring skills (Hennissen et al., 2011), which can support this process.

The design principles promote anticipatory reflection and explicate teacher education practices from the study of Bronkhorst et al. (2011) contains elements of the design principle *look at the underlying processes of teaching and learning*. They both invite student teachers in different ways to look at the underlying principles of teaching and are merged in this study to one design principle. This design principle helps student teachers to gain insight in the underlying patterns and causes in teaching, which is necessary in order to deliberately choose for activities which goes beyond their current abilities and support their development (Ericsson, 2006).

*Creating a powerful learning environment* encompasses, as shown in table 8, three design principles from the study of Bronkhorst et al. (2011): require student teacher to draw on pupils as feedback, support student teachers' creation of powerful learning context, and teach about learning to teach. This might be due to the assumption that student teachers can deliberately use all kinds of sources in their learning environment, like their pupils, in order to develop themselves (e.g. Dunn & Shriner, 1999; Ericsson et al., 1993). The design principle teach about learning to teach is also related to the design principle *include diverging perspectives*, while both assume that student teachers need to be aware of multiple perspectives. This broadens their reference framework Hagger et al. (2008), which should enable them to deliberately choose for a way of learning to reach their goal.

### 4.5 Limitations

Probably because of the small number of participants, this study couldn't give a significant conclusion about the agreement between the ILTP and the diagnosis of the student teachers' mentor in measuring the learning orientation of the student teacher. Next to this, the results could be bounded to the context in which this study takes place. Therefore, the results might not be applicable in other settings.

### 4.6 Implications and further research

The aim of this study was to describe how student teachers' meaning-oriented learning and deliberate practice can be stimulated during their internship. It builds on the research of Bronkhorst et al. (2011), who investigated how to stimulate it in practice. In line with the scaffolding theory, this study first examined how student teachers and their mentors diagnose the student teachers' learning orientation. The results showed that they are not able to estimate this in line with the ILTP. Student teachers' mentors even significantly overestimate their students' learning orientation. This means that, before using the intervention strategies, the capability of student teachers and their mentors in diagnosing the learning orientation needs to be improved. Next to this, the way mentors assess the competency reflection and development, which is one of the

seven required competencies for student teachers, could be evaluated because this closely corresponds to the elements of meaning-oriented learning. Further research can be done in order to investigate if the results can be generalized to other teacher education institutes in The Netherlands, where also the agreement between the ILTP and de diagnosis of the mentor about the learning orientation of the student could be repeated with a larger number of participants. Also the way teacher educators diagnose their students' learning orientation can be examined. Next to this, further research can be done about how to improve the way of diagnosing student teachers' learning orientations. Also the quality of the assessment of student teachers' mentors, based on the seven competencies, could be a subject in further research.

The length of the teacher education program is mentioned in relation to preconditions of learning, an additional section in this research. According to several expert mentors and in line with the theory about both concepts, one year could be too short to change a students' learning orientation. Further research could investigate whether induction programs could support student teachers to continue this process after the teacher education.

Together, the design principles in this study and in the study of Bronkhorst et al. (2011) give a complete view on how to stimulate meaning-oriented learning and deliberate practice during teacher education. When this will be implemented within the teacher education, further research is needed to see whether the intervention strategies are feasible and to check if student teachers' learning changes to a more meaning-oriented and deliberate way of learning. Checking student teachers' learning is also seen as the fourth and last step in the theory of scaffolding.

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