

What and how do student teachers learn during school-based teacher education

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ABSTRACT

This study looks at how student teachers learn to teach during school-based teacher education. It explores the changes that occurred in the practical theories of the student teachers and how the student teachers made these modifications. Eight student teachers were closely monitored during their training. The study's findings show that all student teachers developed broad, well-structured practical theories that focused on pupils' learning processes. Their learning processes displayed considerable individual variation. As a result of these findings, several questions have been formulated for further research concerning the impact of learning style on learning outcomes and learning in a work-based context.

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1. Introduction

Teacher education in the Netherlands has shown a trend in recent years towards a school-based model, a form of teacher education in which the student teacher is employed as a teacher. This paid student-teacher model concerns in particular the fourth year of training for teachers in primary education and lower secondary teacher education and one year post graduate teacher education at the university for upper secondary education.

These programmes offer student teachers an initial in-service training in which practice occupies a prominent place. From the outset, the student teachers have all the responsibilities of a regular teacher. There are good arguments for learning the profession in this way. Teaching is after all a complex activity and complex operations can be learned effectively in an authentic context (see inter alia Buitink, 1994; Howey & Zimpher, 1994; Johnson, Ratsoy, Holdaway, & Friesen, 1993). Positive experiences of both teacher educators and student teachers with this form of training (see inter alia Van Streun, 1992) could be a further argument for preparing for the profession through school-based teacher education.

There are also reasons to be concerned about this development. All too often, what is learned might be an everyday pedagogy of 'showing and telling', in which the underlying principles are not made explicit and learning occurs through imitation and adaptation.

Stones (1992) speaks here of the acquisition of a 'mediocre pedagogy' reflecting traditional teaching culture. Such a pedagogy is demonstrated to student teachers in schools in day-to-day practice; it is valued by pupils and forms part of the practical knowledge of experienced teachers that is expressed in discussions and mentoring interviews. Underlying principles often remain unaddressed and, if they are addressed, are not always theoretically underpinned. This danger is exacerbated because implicit learning about the profession constitutes a significant part of school-based learning to teach. In the implicit learning process, teachers and student teachers learn how to teach without being conscious of it, let alone of how they mastered the skill (see Bolhuis & Simons, 2001; Van der Klink & Streumer, 2004). Koetsier, Farrow, and Wubbels (1996) are of the view that this type of teacher education equates with the master-apprentice model, with all its attendant disadvantages.

This concern on the one hand and the positive experience with school-based teacher education programmes on the other prompted a study of student teachers' learning processes during school-based teacher education (Buitink, 1998). This study, conducted among student teachers attending a one-year post graduate university training programme, focused on whether or not the 'immersion' in practice would chiefly lead to a 'mediocre everyday pedagogy', to a pedagogy of 'showing and telling' in which the underlying principles of education and teaching would not be addressed and on the way student teachers develop their thinking about teaching and learning. Therefore we need to know more about the 'theory' which student teachers develop and which

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guides their behaviour in the classroom. In the present study this theory of student teachers is called practical theory (see [Beijaard & Verloop, 1996](#)) which means the theory the student teachers use in practice, the theory that student teachers actually work with rather than what they espouse. [Argyris and Schon \(1974\)](#) mark this distinction with the terms ‘theory-in-use’ and ‘espoused theory’. A practical theory contains all the terms, notions, perceptions, opinions and convictions that the student teacher uses when preparing, delivering and evaluating teaching and when thinking about teaching (see [Eraut, 1994](#)). Practical theory is based on personal experiences (for example as a student) and professional experiences as a teacher (see inter alia [Calderhead, 1988](#); [Johnston, 1992](#)). Practical theory is thus the fairly integrated sum total of experiential knowledge (as a person and as a teacher), academic or theoretical knowledge and knowledge acquired through interaction with others. Some authors also call it practical knowledge (see [Beijaard & Verloop, 1996](#); [De Vries, 2004](#); [Eraut, 1994](#); [Meijer, 1999](#)). In this study it is assumed that student teachers whose theories are well developed are aware of the underlying principles of teaching and education and have a more than ‘mediocre everyday pedagogy’.

Given the decision to define learning of student teachers as changes occurring in their practical theory, the research questions for this study are as follows:

- I Do student teacher’s develop a well developed practical theory?
- II How do student teachers modify their practical theory?

The first question concerns the content (i.e. what is learned) and the changes that occur over time. The second relates to the way in which student teachers develop – that is, their process of professional development.

2. Underpinning and elaborating on the research questions

2.1. Do student teacher’s develop a well developed practical theory?

As indicated above, it is important to know the extent to which the underlying principles of teaching and learning are part of a student teacher’s practical theory. In other words, we are interested in the content of practical theory, in what the practical theory is about. For example, when student teacher’s practical theory concerns only matters like classroom management, day-to-day issues like lesson organization and his or her own performance one can say we deal with a mediocre practical theory. But when the practical theory covers also questions about pupils’ learning processes and school context we deal with a more developed theory. However, it is also important to know whether a practical theory allows scope for further development. After all, alongside reaching the initial level of competence, another objective of teacher education is the student teacher’s potential for growth competence.

Against this background we can distinguish three characteristics that enable us to characterize a practical theory as well developed. The first concerns the quality of the content, and is related to the student teacher’s initial competence. Two other characteristics are related to the possibility that the theory can easily be developed further. These two features of a practical theory are the richness and structure.

2.1.1. The content of a practical theory

With regard to the first characteristic a well-developed practical theory covers at the end of the teacher education program not only those categories that are part of the initial competence but has also the focus on pupils’ learning. In the Dutch context, a beginning teacher is expected to master at least the competence requirements set out in the Education Professions Act and drawn up by the

Association for the Professional Quality of Teachers and Other Teaching Staff/SBL ([Ministry of OCW, 2005](#)). However, student teachers do not possess all competences to the same degree. In terms of the content of their practical theory, we can expect a greater emphasis on the concerns of beginning teachers than on those of experienced teachers. [Fuller and Bown \(1975\)](#), [Fessler and Christensen \(1992\)](#), [Vonk \(1982\)](#) and [Eraut \(1995\)](#) state that, at the beginning of their professional development, teachers and student teachers focus primarily on themselves and on managing the classroom situation, on ‘surviving’. Student teachers look at teaching above all from their own perspective as individual teachers. Later their focus turns to what a pupil can learn and to what they themselves can learn as teachers. Then teaching is primarily approached from the perspective of the pupils’ learning processes. Viewed in these terms, we might expect the interpersonal perspective to dominate a student teacher’s practical theory, with classroom management having the upper hand. If, however, practical theory also devotes considerable attention to pupils and their learning process – in other words, if the pupil perspective is present too – we can say that particular student teacher meets one of the criteria of a well-developed practical theory.

2.1.2. Richness of a practical theory

A rich practical theory is one which satisfactorily covers the different possible categories making up the theory’s content. So the term richness refers to the breadth of distribution across the possible content. In his article on differences between beginners and experts, [Berliner \(1995\)](#) states that people with a rich and fairly complete theory (he calls them schemata) require little experience in order to learn. [Bennett \(1991\)](#) is of the view that ‘teachers with more fully developed schemata have a better understanding of the classroom and are therefore more likely to be effective’ (p. 120). [Carter \(1990\)](#) states that teachers with a richer understanding of teaching learn more from unsuccessful lessons and from situations in which everything goes wrong than teachers for whom this is not the case. For these reasons richness of a practical theory is seen as one of the characteristics of a well developed theory.

2.1.3. Structure of a practical theory

With regard to the structure of a practical theory [Novak \(1977\)](#), in [Beyerbach \(1988\)](#) states that meaningful learning occurs when new information is incorporated into a conceptual framework that is linked to other concepts. [Borko \(1989\)](#) and [Pintrich \(1990\)](#) also emphasize the importance of a well-structured practical theory. In other words, the more clearly and coherently student teachers structure their practical theory, the more developed that theory is.

In short, the first research question – what is the nature of the student teacher’s practical theory and what changes occur? – can be specified in the following sub questions:

- Do student teachers develop in their practical theory a focus on the learning process of pupils and do they therefore pass through the stages of a beginning teacher in their development?
- Do student teachers acquire a rich practical theory by the end of their training?
- Does the structure that student teachers impose on their practical theory become clearer and more coherent?

2.2. How do student teachers modify their practical theory

If we wish to describe the learning process of student teachers, it is important to understand their experience of the learning environment, the activities that they subsequently undertake (see inter alia [Oosterheert, Vermunt, & Veenstra, 2002](#)), as well as their

perception of the process whereby they learn to teach and develop as teachers. For this reason, the decision was taken to describe the way in which student teachers modify their practical theory in terms of both their perspective and experience. From the student teacher's point of view, as a learner, the following three aspects are hereby critical: perceived goals, self-concept as learners – including the (active) role that they assign themselves in the development process – and how they perceive the learning environment (see also Verloop, 2003). These three aspects of the learning process will be examined in greater detail below, as will a fourth – namely, stages in the learning process.

The first aspect is perceived goals (see Kroll, 1988; Pintrich, 1990). Pintrich, Marx, and Boyle (1993) state that the objective assigned by the learner to the learning process has a significant impact on conceptual change of the learner.

The second aspect is one's self-concept as a learner. This is a significant factor within the process of learning to teach. The role a student teacher assigns to him or herself in the entire learning process helps to determine the course of that process. Also important for the student teacher is the knowledge of how learning (from experiences) contributes to the development of teaching (Banaji & Prentice, 1994; Calderhead, 1988).

The third aspect is the student teacher's structuring of the learning environment when learning to teach. Lodewijks (1993) has formulated several general criteria that an effective learning environment must satisfy (see also Mulder, 2004). Critical here is the way in which the learner experiences and utilizes the learning environment, certainly if work constitutes part of that environment (see Onstenk, 2004).

The stages in the process of learning to teach are the fourth and final aspect. Hollingworth (1989) states that different types of content are incorporated in stages into the student teachers' practical theory. Russell (1993) believes that these stages are linked to the confidence that student teachers have in their performance in the classroom. Oppewal (1993) also observes a phased development in the practical theories of student teachers. Generally speaking, there is repeated emphasis on phased development in the research on the professional development of beginning teachers (see Burden, 1990).

In summary, the second research question – what characterizes the way in which student teachers modify their practical theory? – is specified more closely in the following sub questions:

- Which objectives do student teachers experience in their training and how do the student teachers differ in this respect?
- How do different student teachers experience the way in which they learn to teach, and in particular the role that they see themselves playing in that process?
- Which sources do the student teachers use in the change process – in other words, how do they use their learning environment?
- Are there different stages in the way that student teachers change and, if so, what are they?

3. Method

3.1. *The study context; respondents and learning environment*

The respondents were student teachers of mathematics in the one year post-graduate teacher training programme at the University of Groningen. The group comprised all eight student teachers of mathematics (the whole cohort) who began the program in September of that specific year and who followed the same modules. During this year they were employed as a teacher, which meant that they had all the duties and responsibilities of teachers and were paid accordingly. Apart from a brief introduction

to the teaching profession in previous years, the participants in the study were not prepared as part of their training for their work as teachers. The student teachers were all students who just completed their university study. Their age varied from 23 to 27 years. Two of them were female, six were male.

The training activities of the student teachers during their student-teacher year can be described briefly as follows:

- In weekly tutorials and supervision activities there was a constant emphasis on learning processes and on pupils' desired learning activities. At the beginning the focus was the everyday practice of the student teachers and concerns like classroom management, later on theories of learning and instruction became more central. At the end of their course, the student teachers were required to draw up and implement an educational plan, underpinned by learning theory.
- The student teachers made their practical theory explicit in their learner reports and through concept maps. In addition, aspects of their practical theory were raised during the mentioned tutorials and supervision.
- The student teachers were asked to reflect on both their practice and their learning process in weekly reports and three-monthly learner reports. Video analysis played a key role in this reflection, with student teachers analyzing a video recording of their own lesson.
- In school the student teachers were supervised by a senior teacher who was trained to be a coach.
- There was close coordination of the institute lecturers' training activities and the coaches' supervision at school. Lecturers and coaches met on a regular basis, discussing the professional development of the student teachers and how both lecturers and coaches made the learning process of the pupils a central issue.

The programme design can effectively be compared with the four dimensions of a learning environment as defined by De Corte (1992). These relate to:

- the content, or curriculum, which should cover all kinds of knowledge
- the diversity and suitability of teaching methods (teaching and learning activities)
- the sequence of the learning tasks, entailing increasingly complex and diverse tasks requiring increasingly meta-cognitive and domain-specific knowledge and skills
- the social context of learning, with an emphasis on the representativity of the learning task, cooperative learning, peer discussion, etc.

Therefore in terms of the 'content' aspect, the problem-solving nature of the content to be learned (teaching) and learning strategies are addressed. Coaching, contact with experts, making the student teachers' own practical theory explicit and comparing their own approach to that of others make up the different kinds of 'teaching and learning activities'. The 'sequence of learning tasks' is expressed in the structure of the complexity experienced and of the diversity of tasks. Finally, with regard to the 'social context of learning', we can say that the learning tasks are representative for the teaching profession and that cooperative learning is an essential component of the programme. An example of the latter is supervised peer coaching during the programme.

3.2. *The nature of the study*

The study is small-scale, descriptive and qualitative. The eight student teachers were monitored closely during their programme.

The cases are described independently of one another in the study, using an identical system of categories based on theory (intra-case studies). Next, the cases are compared using the same system of categories (inter-case study) in order to arrive at patterns, at explanations for the observed patterns and at similarities and differences (see Miles & Huberman, 1994). The eight individual cases are thus analyzed in relation to one another, within a pre-determined theoretical framework, resulting in a multiple case study (see also Hutjes & van Buuren, 1992).

3.3. Data collection

Data for answering the first research question were gathered using learner reports, concept maps and planning and evaluation reports. Data for answering the second research question were gathered using interviews and concept maps on learning to teach.

In total the study participants carried out four types of activity for the purpose of the study, the first three of which were also required activities for their programme. The first activity involved drawing the mentioned concept maps (see inter alia Beyerbach, 1988; Meijer, 1999). This is a diagrammatic representation of concepts and their hierarchical interrelationships, which the participants felt were essential to the subject in question. For the purpose of answering the first research question, on five occasions the student teachers drew up a concept map of their practical theory on teaching. These concept maps were used for describing the content and for describing the structure the student teachers impose on their practical knowledge. For the second research question, they drew up one concept map of their ideas on learning to teach.

The participants' second activity was to write a learner report, which they did four times. The purpose of the report was to identify learning outcomes; the report contained a review of the previous period of teaching and a look ahead at the coming period. The participants indicated what they had learned in the previous period, what was important, what events were relevant and what aspects they had focused on. They were also asked to reflect on their practical theory. The learner report was used to reconstruct the content of the practical theory at that particular moment.

The third activity comprised planning and evaluation reports. The participants wrote four reports on lesson planning. They were asked to show why they had planned the lesson in that way and which events from previous lessons affected their planning. After the lesson, they reported on the extent to which they had adhered to the plan. The planning and evaluation reports were used to reconstruct the content of and changes in the practical theory.

Interviews, of which there were two, comprised the fourth activity. The first, conducted mid-way during the programme, concerned the process of learning to teach, in other words the way in which participants modified their practical theory. It was a semi-structured interview, conducted in accordance with the general interview guide approach (Patton, 1990), which entailed drawing up a list of subjects that functioned as a guide during the interview. The list was the same for all student teachers. Within these subjects the researcher was free to go on asking questions so that participants could spell out their responses in greater detail. The subjects related to the participants' activities in preparing, delivering and reviewing the completed lessons. The following kinds of questions were asked: 'What sources do you consult for lesson preparation?', 'Do you ever formulate action items?', 'Do you adjust your lesson plan during the lesson?', 'How do you look back on the lesson?', 'Do you ever formulate questions as a result of your lesson?' General matters were also addressed, such as effective ways of becoming a teacher and the learnability of the profession.

The second interview was conducted with regard to the internal validation of the researcher's reconstruction. It validated both the

reconstructions of the content of and the changes in the practical theory and that of the participants' learning process. This interview, which took the form of a member check interview (see Van Ijzendoorn & Miedema, 1986), was held at the end of the programme after graduation. It was also semi-structured and was conducted in accordance with the general interview guide approach.

Data were collected at fairly regular intervals in order to identify the changes in the practical theory during the programme. The participants drew the first concept map in their first week of training. At the end of October they submitted both the learner report and the planning and evaluation report. They also drew their second concept map in that period. This was repeated shortly after the Christmas holiday and in April. At the end of the programme (in mid-June) the participants submitted the final learner report together with the final concept map. The member check interview took place at the end of June, after the participants had completed the programme. The interview about learning to teach was conducted in February, and at the end of May the participants drew their concept map for learning to teach.

3.4. Data analysis

The study involved several steps to ensure the validity and reliability of the generated data and its analysis. Because the study was carried out by one of the lecturers of the student teachers the interviews were conducted by another researcher to prevent social desirable answers and expectancy effects. Another measure to prevent these effects was the use of so called 'system documents'. This means that the instruments used for collecting data were documents the student teachers produced for their programme so they did not have to do additional work for this study. The reliability of the reports was also enhanced by making clear to the participants that their learner reports would not be used for assessment purposes (De Groot, 1980). A fourth measure entailed describing the research procedure in detail. Furthermore the reconstructions were discussed with the participants using a member check interview (see Van Ijzendoorn & Miedema, 1986) and method triangulation has been applied (see Smaling, 1987). Finally, Cohen's kappa values were calculated using different coders to categorize the reports and the content of the concept maps. The Cohen's kappa for the learner reports was 0.56; for the planning and evaluation reports it was 0.60 and for the concept maps 0.75. The low kappas for the reports in particular can be explained by the fact that it is very difficult for coders using an extensive system of categories to code substantial and complex data like the reports in a similar fashion.

Before a start was made with the case reconstructions, the raw data were organized in order to permit both intra-case and inter-case qualitative analysis. The data were coded with the help of two systems of categories to enable comparisons: one system for mapping the content of and changes in the practical theory (see Section 3.4.1) and another for describing the process of learning to teach (see Section 3.4.3). These systems were used to code the reports, the interviews and the concepts in the concept maps. The structures of the concept maps were also categorized (see Section 3.4.2).

The various data obtained at different times from the different methods were compared for each case and the cases were then compared with one another.

3.4.1. System of categories for the content

To establish if the content of a practical theory is rich and about pupils' learning the student teachers' practical theories were described using a system of categories based on three perspectives with which theories on learning and teaching process in classrooms

and schools can be described – namely, the instructional, interactional and contextual perspectives. These perspectives enabled all relevant participant data to be considered.

The instructional perspective contains categories that Boekaerts and Simons (1993) describe in the ‘planning stage’ of teaching. However, with regard to the subcategories, their descriptions were not used literally in all cases because not all aspects lend themselves to describing a practical theory – there is a rather large gap between Boekaerts and Simons’ terms and the concepts used by the participants. For this reason, other subcategories are used for some categories.

The interactional perspective together with its accompanying categories is borrowed from Kounin (1970). Some categories described by Boekaerts and Simons (1993) have been added to this perspective.

In the contextual perspective, the emphasis was on the work environment, with the categories of ‘school’ and ‘teaching policy’. The categories were subdivided into subcategories.

Table 1 contains a comprehensive overview of the categories and subcategories in each perspective. In the table it is clear that the pupils’ learning process is part of the categories.

3.4.2. Categorizing the structure of the concept maps

In order to be able to answer the question about the structure the student teachers impose on their practical theory it is important to know just how student teachers structure their concept map. The following two dimensions were used to classify these structures into categories: the degree of clustering and the interconnections between clusters within the concept map. By combining these two dimensions we can distinguish the following three structures (see Fig. 1):

- An index structure. All concepts are arranged arbitrarily around the central concept. A concept map with an index structure is like a book index: it is a list of concepts without any organization into broader concepts.
- A cluster structure. There are clear clusters of concepts that are related to the core concept but not to one another. This kind of network is similar to a book’s table of contents, with different sections organized into chapters.
- A network structure. The clusters in the cluster structure are interlinked in different ways, with a relationship between the clusters. This structure is the most coherent structure.

3.4.3. System of categories for the process of learning to teach

The available literature on student teachers’ learning processes while learning to teach in a school-based context did not offer enough to go on for a ready-made system of categories for the present study. Using an existing theory, it was not possible to classify the participants’ data into categories. In order nevertheless to arrive at a workable system of categories, one was developed from the data. In other words, categories and subcategories were developed using relevant and related parts of the transcripts. This system was then applied to other parts of the transcripts. The system was then used to organize, analyze and describe the process of learning to teach. Table 2 contains a description of the system of categories for the participants’ learning process.

3.4.4. Data presentation and processing

First of all, a within-case display was made of the data (Miles & Huberman, 1994). This entailed making a table for each case showing whether a particular subcategory occurred, the time during the programme at which the participant reported on that subcategory, the frequency and the importance attached to that subcategory. This matrix allows us to reconstruct for each case the

Table 1
System of categories for describing the content of practical theory

Perspective	Categories	Subcategories
Instructional perspective	Content, curriculum	Sequence, order Structure, cohesion Knowledge and knowledge level Pupil motivation
	Analysis of start situation	Facts Procedures, methods Rules, concepts Principles
	Learning objectives	Orientation Familiarizing Integration Application Learning to learn Homework
	Learning activities	Teaching method Type of discussion Type of assignment Feedback during learning process Testing Media, teaching aids
Interactional perspective	Teaching methods, lesson structure	Teaching method Type of discussion Type of assignment Feedback during learning process Testing Media, teaching aids
	Classroom management	Noting and dealing with (bad) behaviour Responding to context, improvising Transitions between teaching methods Pace, rhythm Involving pupils Motivating pupils Pupil responsibility Variation in lesson
	Teaching skills	Explaining Asking questions Having the pupils work independently Giving feedback Testing Using media, blackboard, etc.
	Pupils	Personal details (age, name, etc.) Backgrounds Development Class
Contextual perspective	Teacher, the person	Backgrounds, personal Teacher in development Role acceptance
	School	Organization Educational organization Colleagues Building, classroom Timetable, structural Other teachers’ lessons Identity, denomination
	Policy	

changes in practical theory. Finally, the data has been further summarized and presented in a cross-case display showing the changes per case on a case-by-case basis.

For the learning process, the protocol of the interview and the concept map are coded and summarized per case. These summaries are compared with one another in a cross-case display.

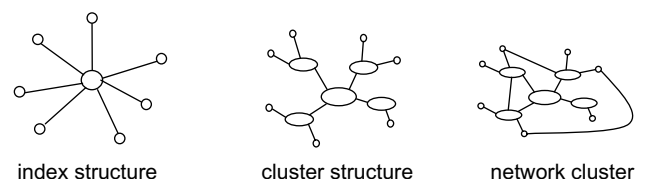


Fig. 1. Structure of concept maps.

Table 2
System of categories for describing the process of learning to teach

Category	Description
Learning activities & system used	The (system of) activities undertaken to introduce changes in delivery of and thinking about teaching. Examples of activities are trying out, short and long-term evaluation, short- and long-term action items, seeking feedback, drawing conclusions.
Reasons	Reasons given for undertaking certain learning activities, such as classroom experiences and programme requirements.
Use of sources	Information sources (books, people, experiences, etc.) which learners use in their learning process.
Experience of learning environment	How learners experience the environment (school, programme) in which they are learning, the contribution that the environment makes to this learning process.
Phasing	Changes in how student teachers learn to teach during their training.
Description of the learning process	The idea that learners have about how they learn.
Learnability	The degree to which the profession can be learned and the conditions under which this learning can occur.

4. Findings

In this paragraph the data will be presented, ordered using the category systems. In paragraph 5 the research questions will be answered using these ordered data.

4.1. The content and structure of the participants' practical theory

The first research question concerning the nature of the participants' practical theory and the changes that occur is answered by checking the similarities and differences between the participants for each category. Three features of the practical theory (see Section 2.1) were examined, namely content, richness and structuring.

Firstly, with regard to the content, for each perspective of the content of a practical theory (interaction, instruction and context, see Section 3.4.1) an indication is presented below of the content of the participants' practical theory. Extracts from learner reports and from interviews with participants are used for the purposes of illustration. At the end of this section, there is a summary of the changes within the practical theory during the year. Part of a participant's time-ordered display is reproduced and there is a brief description of how that participant's practical theory developed. The names of the participants in this article are fictitious.

If we look at the interactional perspective, we see that seven participants identified a link between interaction with pupils and the instructional perspective – a successful lesson depends on both aspects. Two participants stated the following:

'You have to teach in such a way that pupils can learn independently where possible. To do so, you need first and foremost a good work environment.' (Charles, learner report 3)

'(...) pupils will learn better if there is a positive work atmosphere in the class'. And: 'I believe that the best way to achieve a good atmosphere is to be interested in your pupils. (...) If teachers build up a good bond with their pupils, the pupils will gain trust in them. This makes it easier for pupils to come to the teacher with certain problems that can affect the learning process.' (John, learner report 2)

The study showed that over time the pupils' learning process as described in Table 1, alongside organizing teaching methods, became important to the participants within the instructional process. This sometimes took the form of providing pupils with guidelines. For example, at the beginning of the programme Gerald

mentioned the curriculum, aspects of teaching methods and lesson structure. Four months later, however, he was most concerned about how to convey the material so that pupils had something to go by when solving problems. The following quote makes this clear:

'In the period just past, I devoted more time to the question of how to get the subject matter across. In the first eight weeks, I spent far less time looking at alternative ways of conveying the subject matter. (...) I have a feeling that pupils appreciate being told how to approach problems.' (Gerald, learner report 2)

For seven of the eight participants, pupil learning was not simply a question of acquiring or applying knowledge, but also of integrating what was learned into existing knowledge. One form of integration was to have pupils make this knowledge explicit. As one participant said:

'Apart from teaching (giving direction), a teacher's job is to guide the pupil's learning effectively. (...) It is important when guiding learning processes to show your thought processes clearly. (...) I also find it important to encourage pupils to constantly say to themselves what they are doing.' (Charles, learner report 2)

Four participants had also allocated space within their practical theory to the process of 'learning to learn'. One way in which this was expressed was to encourage pupils to tackle problems systematically, as is clear from the following quote:

'And that's what I advised them – don't give up straightaway. Read the problem through once more very carefully. What information can you get from it? What exactly is being asked? And what do you need to work it out?' (Colin, interview about the process of learning to teach)

With regard to the contextual perspective, it should be said that all participants realized that their performance in class was part of what happened within the school, and that they were part of the school and did not operate in a classroom in isolation. One participant said in the interview:

'This also applies to staff meetings and the department. Looking at the whole, and at my place in the whole, it encourages me. It makes me want to add my ideas to issues arising from other classes.' (Colin, learner report 2)

Another participant described the effect of the school context on his style of teaching:

'We did a project, a project on active learning. It was about asking questions, how you ask questions (...). And then you see that these people who are 50, they say "hey, that's a useful tip", and they've been teaching for years. And the influence of colleagues, they don't unquestioningly accept the existing situation. In a more rigid school, I would probably have adopted more of that style.' (Peter, interview about the process of learning to teach)

Five participants regarded not only the school as a whole and the colleagues as being relevant to their own teaching, but also the educational set-up of the school.

Summarizing we see with regard to the content of and the changes in practical theory, all eight participants quite early in their training clearly approached teaching as a combination of different factors, such as dealing with bad behaviour, variation within the lesson, pupil motivation, responding to the context, attention to pupil development and backgrounds, their own role as teachers and the necessary instructional skills. The pupils' learning process became increasingly important, with four of the eight participants also being concerned with 'learning to learn'. All categories were part of the practical

knowledge of the participants. To illustrate the changes within the practical theory, a description follows below of the changes Charles made. This is followed by a time-ordered display in which there is an overview of these changes (see Table 3). During the programme, Charles addressed all aspects in his practical theory, linking the interactional and instructional perspectives to one another.

4.1.1. The interactional perspective

Charles raised a wide range of aspects of the interactional perspective, with the emphasis on work climate and role acceptance, with teacher clarity regarding rules and explanations as the overarching idea.

Maintaining order was the key from the outset for Charles. From October, order was related to 'work climate'. For Charles, work climate was a combination of a certain type of order, teacher clarity with regard to rules and explanations and the teacher's personality. The context of the lesson, the timetable and related matters also

became increasingly important to him. In the course of training, interaction was viewed less and less in isolation from other factors, but became linked to the instructional perspective.

4.1.2. The instructional perspective

All aspects of the instructional perspective featured in Charles's practical theory during his training. At the start, Charles was concerned with teaching methods and with lesson planning and structure, which had to be clear and identifiable for the pupils. Later, from January onwards, the pupils' learning process became important and Charles related this to lesson structure and teaching methods. Working independently by students gradually assumed an important role.

In addition, teaching content occupied a place in Charles's practical theory from the outset. Where necessary, he adapted textbook and method to help pupils deal with content. In his practical theory, he described aspects of the instructional perspective – such as 'learning processes' and 'teaching methods' – in relation to aspects of the interactional perspective, such as 'involving pupils' and 'giving responsibility to pupils'.

4.1.3. The contextual perspective

Within the contextual perspective, Charles initially made detailed mention of many aspects of the school, such as the arrangement of the classroom and building and the school rules. In mid-January he regarded the school (organization and colleagues) as being very important. After that, the school as an environment became a lesser concern for him, and he discussed it in broader terms. By and large, he did not discuss educational policy.

Besides the content and the changes with the content, the structure of the practical theories was described using the previous given system. It emerges that participants had given their practical theory a network structure by the end of their training. They arranged concepts in clusters, which were in turn interlinked (see Fig. 2 for examples of such concept maps).

4.2. The participants' learning process

The second research question concerns how the participants modified their practical theory. Much more so than the first question, this question reveals differences between the participants. Major individual differences emerged in two aspects of their learning processes: perceived goals and their approach to the learning process. The findings described below are illustrated by statements of participants, all of which come from the interview about the process of learning to teach.

The eight participants had different perceived goals. For three of them, these goals had an external focus, with an emphasis on teaching efficiency. Provided that no major problems occurred, such as too many fails or serious problems with classroom management, they made no changes to their teaching. For example, Paul said that especially problems in the classroom were a reason for learning:

'If everything's going well, you don't change anything. (...) Perhaps things never go smoothly for me, and that's why I'm

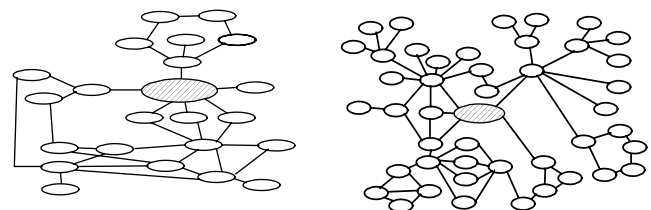


Fig. 2. Examples of concept maps.

Table 3
Time-ordered display of changes in Charles's practical theory

Karel	Start	Autumn	Christmas	Easter	Finish
Content	Infrequent Not varied	Infrequent Not varied	Quite frequent Not varied	Infrequent Not varied	Infrequent Not varied
Objectives			Infrequent Not varied	Infrequent Quite varied	
Initial situation				Quite frequent Not varied	
Learning		Quite frequent Quite varied	Quite frequent Quite varied	Quite frequent Highly varied	Infrequent Quite varied
Lesson structure teaching methods	Very frequent Core concept Quite varied	Very frequent Highly varied Important	Very frequent Quite varied	Infrequent Quite varied	Infrequent Not varied
Classroom management	Infrequent Not varied	Very frequent Core concept Highly varied Important	Very frequent Core concept Highly varied Important	Very frequent Core concept Quite varied Important	Very frequent Quite varied Important
Instructional skills		Infrequent Quite varied	Infrequent	Infrequent	Infrequent
Pupil	Infrequent	Infrequent	Infrequent	Infrequent Quite varied Important.	Infrequent
Teacher	Quite frequent Highly varied	Quite frequent Highly varied Important	Infrequent Core concept Quite varied	Infrequent Core concept Quite varied	Very frequent Highly varied
School	Quite frequent Core concept Quite varied	Infrequent Little variation	Very frequent Core concept Quite varied Important	Infrequent Quite varied	Infrequent Little variation
Policy					

always doing things differently (...). Or perhaps they do, but that I say, well, I've been trying it this way for a while, let's try doing it differently. But in any case my approach up till now has been, okay, this is working well, I'll try this for a while and if it doesn't work any longer, well, then I'll think of something else... I don't know.'

Another participant, Gerald, had this to say:

'Then I think, oh well, that really wasn't so bad. Then you've reassured yourself once more.'

Three other participants focused in their learning process on improving the effectiveness of their teaching – in other words, alongside 'efficiency criteria' they used more intrinsic criteria aimed at effective teaching. Influenced by their environment, they used a standard for good teaching that went beyond the prevention of problems. Two of them stated:

'(...) or if I myself am just not really satisfied, then you think, no that didn't really come across properly (...). (Charles)

'Yeah, it started some time after Christmas. Active learning, that is. I thought, it's time I made a start on that too, it's time I joined the bandwagon, became a bit trendy.' (Peter)

The perceived goals of the other two participants focused on further developing their practical theory. One of them, Colin, used the following saying as a guide: 'The only constant in change is the inevitability of change itself.' Their teaching was governed not only by what happened in class, but by their own curiosity.

If we consider the student teachers' attitude to their learning process, we find that three of them adopted a passive approach. They undertook no conscious learning activities, mastering as they went the knowledge and skills that allowed them to function as teachers at that moment. Paul, for instance, compared this process with learning to skate:

'(...) yes, it's probably like learning to skate, in the beginning you learn skating by trial and error, after that it becomes a routine operation and you do it unconsciously, you don't think about it any more.'

These student teachers did not formulate any long-term action items. Nor did they plan their learning process or systematically carry out short or long-term evaluations. They were interested in how the day-to-day lessons went, formulating action items for the short term, from lesson to lesson. Direct feedback and experiences 'of the moment' played a key role in their learning process. They seemed to experience their learning process as being governed solely by external factors.

The five other participants adopted an active approach to their learning process. They set longer-term objectives for themselves, actively sought feedback and evaluated their learning process. Two of them said:

'Yes, by doing a lot and by taking a good look at yourself and by talking to lots of people, I think that that's very important.' (Charles)

'I felt very strongly, especially in the beginning, that it's all very well for them to tell me how I have to do things, but you still have to experience it for yourself. What's more, it is precisely this observing and being observed that are very important aspects of learning to teach. Nothing has effectively changed in that regard'. 'You can say time and again what the theory is, but it's not until you have experienced it that you can do something with it.' (Ed)

These five participants had a positive approach to the learning environment. Interestingly, two of the five changed their initial passive attitude into an active one in the course of their training.

The stages of the learning process seemed to include an initial stage which emphasized role acceptance as a teacher and the

accompanying acquisition of classroom control and developing an appropriate mental model of the teaching profession. Charles said this about the different stages:

'After all, now you have more experience, you dare to do more. In the beginning, you perhaps tended to be a little slack in how you went about things. Yes, now you're more self-assured. But that also has to do with the fact that in the beginning you feel you belong more with the pupils than with the teachers. I find that's the most important change.'

And Colin said:

'(...) I didn't really have a proper overview. There is so much to experience in those first lessons, it's really quite nerve-racking. It takes all your concentration. All your energy goes into surviving. And so gradually you no longer need your energy to survive, you just do, and then you can devote that energy to something else.'

All participants went through this stage and found themselves in the next one. In the second stage, they modified their practical theory and were more focused on the organization of teaching and on the pupils' learning process.

Lastly, the learning environment was found to be a key factor. The participants found it useful to write material, like learner reports, as part of their programme:

'Usually the reports. Report 1 and report 2, that sort of thing. Yes, I really enjoy writing those reports. Those reports, that's when you really check things out for yourself, it's a matter of what am I actually doing and why. And otherwise, then the lesson's over and it went okay and the next time you'll see again. (...) That's great. Beforehand you think: oh, what should I write? But that's just what makes you think really hard. You ask yourself why am I doing it this way? (...) And that is certainly very valuable.' (Tim)

Also activities like analyzing their own lessons using video recordings were something else that the participants found useful.

'It was very clear on the video, in the video analysis. Then I could see very clearly, oh, so that's how I do it.' (Colin)

5. Conclusions; answering the research questions

With regard to the first research question (do student teacher's develop a well developed practical theory) we distinguished content of the practical theory, especially the focus on pupils' learning, the richness and the structure. Looking at the content we can conclude that the student teachers that participated in this research developed a practical theory in which they pay attention to pupils' learning. Given the stage of professional development at which the participants found themselves, this development of the content of their practical theory can be described as remarkable. If we compare the results of this study of the development of practical theory with theories on the stages of professionalization (Eraut, 1994; Fessler & Christensen, 1992; Kagan, 1992), we can say that the participants have taken an important step towards becoming professionals because they have made room in their practical theory for the pupils' learning process as a factor in teaching. In the literature just cited, we see that the focus on pupils' learning usually occurs later; generally not until after teachers have been working in the profession for a few years. As stated in Section 2.1 the focus on pupils' learning is an indicator for a well developed practical theory.

With regard to richness, the second sub-question of the first research question, it emerged that almost all subcategories of the system of categories used in the study featured in the practical theory of all participants. This means that by the end of their

training, participants had developed a practical theory which allowed scope for the instructional, interactional and contextual perspectives. We can conclude from this that all student teachers developed a rich practical theory.

Taking the third aspect, the structure of the practical theory, into account it emerges that participants had given their practical theory a network structure by the end of their training. They arranged concepts in interlinked clusters. These were coherent structures. As indicated above (see Section 2.1), the use of such a structure points to a well-developed practical theory.

The first research question was: is the practical theory of student teachers at the end of the school based teacher education well developed? We can answer that the participants of the study developed a well developed practical theory that is rich with a coherent structure and a focus on pupils' learning. As described in Section 1 the main reason for this research was the danger that in immersion programs student teachers learn how to teach without being conscious of it. They would learn an everyday pedagogy of 'showing and telling', in which the underlying principles are not made explicit and learning occurs through imitation and adaptation. The answer on the first research question, however, points in the direction that this is not the case.

The second question this research tried to answer was: 'how do student teachers modify their practical theory?' To answer this question we looked at the perceived goals of the learning process, the experience of their learning process, the perception of the learning environment and the different stages they go through.

Differences were observed in the participants' perceived goals and the attitude to their learning process. We encountered three types of perceived goals (see Section 4.2): efficiency goals, effectiveness as a perceived goal and the perceived goal of 'construction'. We can find similarities between these goals and goals of learning processes we find in the literature (Pintrich, Marx, & Boyle, 1993; Shuell, 1990; Vermunt, 1992). We find that the efficiency goal is equivalent to 'being focused on concrete actions', to 'certificate and test-focused' and to 'performance'. Effectiveness as a perceived goal corresponds to 'the application of understanding to other contexts', 'professional orientation' and 'a focus on mastering something'. Finally, the perceived goal of 'construction' is similar to 'concept formation', 'personal interest' and 'being focused on knowledge as object'. Thus the kinds of perceived goals encountered in the study correspond to those cited in the literature. The same can be said of the different participants' attitude to their learning process. The active and passive attitudes found in this study are similar to what Iran-Nejad (1990) calls the active and dynamic regulation of the learning process.

Looking at the other two aspects of the second research question, how do they use their learning environment and are there different stages in the way that student teachers change their practical theory, the following can be said. All the participants of the study found the learning environment to be a key factor. Also all participants went through an initial stage in their learning process which emphasized role acceptance as a teacher and the accompanying acquisition of classroom control and developing an appropriate mental model of the teaching profession and found themselves in the next one. In this second stage, they modified their practical theory and were more focused on the organization of teaching and on the pupils' learning process.

6. Interpretation of findings and recommendations

6.1. Interpretations of the findings

The primary impetus for this study was a concern for the quality of one particular school-based teacher education program. The focus was primarily the content of the practical theory developed by student teachers and how student teachers would learn to teach.

There was a concern that 'immersion' in practice would chiefly lead to a 'mediocre everyday pedagogy', to a pedagogy of 'showing and telling' in which the underlying principles of education and teaching would not be addressed.

This concern has been shown to be without foundation for the eight participants in this study. The question of how pupils learn the subject occupied a clear position in their practical theory which was well developed. The participants' learning process displayed individual differences on two important aspects (perceived goals and attitude towards their learning process), much more than was the case with the content of their practical theory. As the study found no major differences between the participants with regard to the first research question, it appears that the differences within the learning process have little or no influence on the learning outcomes. The probable explanation for this can be that the learning environment of the teacher education programme was of more importance than the learning process. This means that the learning outcomes were probably primarily determined by the organization of the learning environment. An important factor in this learning environment can be the fact that the institute lecturers and the coaches in the schools agreed on the fact that developing a practical theory is important and that merely adaptation to everyday teaching practice had to be avoided. The fact that the training context was important for the content of the developing practical theory would mean that the results of the study with regard to the first research question – the development of the nature of the practical theory – only apply to student teachers who are trained in the student-teacher model under consideration, in which the learning environment discussed under Section 3.1 is present. It is not necessarily the case that the same learning outcome would be achieved for student teachers in school-based teacher education with another learning environment.

6.2. Recommendations for further research

Although the present study provides answers to a number of important questions about the learning effect and the learning process in learning to teach, it also raises other questions. The first concerns the influence of differences in the learning process on learning outcomes. It would appear that the effect of these differences on the learning outcomes is small in the learning environment in question. We can therefore ask ourselves whether the effect of differences in learning processes depends on the context in which the student teacher learns to teach. The answer to this question has implications for both the design of the programme itself and for how beginning teachers are supervised in their first years of teaching.

A second question concerns the organization of the learning environment. Evidently, the learning environment of the teacher education programme under study was designed in such a way – that is, richly – that student teachers undergoing a school-based teacher education program developed a broad practical theory, which they themselves found coherent, aimed not only at surviving, but at shaping the pupils' learning process. The question we can now ask concerns the critical elements of that learning environment: what are the minimum requirements for the learning environment in school-based teacher education if student teachers are to develop a broad, high-quality practical theory?

The third question concerns the process of learning to teach in the school. After all, this study did not investigate the learning process at the workplace. Instead, it focused on the intentional and formal learning within the programme and did not take into account the learning process (implicit and informal) in the school (see also Bolhuis & Simons, 2001; Van der Klink & Streumer, 2004). A logical next step to gain an understanding of workplace learning would be to examine the contribution of various learning activities in the workplace and the contribution of work itself to the learning effect (see Hoekstra, Beijaard, Brekelmans, & Korthagen, 2004).

Finally, a fourth question concerns the first few years in which teachers enter their profession. How does their practical theory develop further? Do beginning teachers adapt their practical theory and their actions to day-to-day practice or is the context within which they work less important? There are grounds for assuming that the latter is the case. Brouwer and Korthagen (2005) conclude that in some situations what is learned during training does indeed continue to influence how beginning teachers act. This applies in particular after a period in which classroom management is so important that the beginning teacher falls back on teaching methods with a teacher rather than a pupil focus. Therefore it is of importance to investigate whether teachers trained within the model investigated here also experience such a relapse.

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