The contribution of assessment experiences to student teachers' self-efficacy in competence-based education

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HIGHLIGHTS

- We studied how assessment experiences contribute to student teachers' self-efficacy.
- This research focuses on the assessment characteristics authenticity and feedback.
- Authenticity and feedback positively influence student teachers self-efficacy.
- Student teacher self-efficacy is influenced during all portfolio assessment phases.
- Results provide a fine-grained view of several types of self-efficacy information.

ARTICLE INFO

ABSTRACT

Earlier research argues that educational programmes based on social cognitive theory are successful in improving students' self-efficacy. Focussing on some formative assessment characteristics, this qualitative research intends to study in-depth how student teachers' assessment experiences contribute to their self-efficacy. We interviewed 15 s year student teachers enrolled in a competence based teacher educational programme. Thematic content analysis results reveal that the assessment characteristics 'authenticity' and 'feedback' exert a positive influence on student teachers self-efficacy during all phases of the portfolio competence assessment. The results provide a fine-grained view of several types of self-efficacy information connected with these assessment phases.

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1. Introduction

Cross-national research findings (Jensen, Sandoval-Hernández, Knoll, & Gonzalez, 2012) have demonstrated that on average, nearly 10% of teachers in the first 1–3 years of their teaching leave the profession. In addition, the research findings also questioned the effectiveness of new teachers compared to experienced teachers by showing that new teachers provide less actual teaching and learning time in their classes than their experienced colleagues do. This finding is related to new teachers' low self-efficacy.

Moreover, lower academic results of students are associated with low teacher self-efficacy (see e.g. Muijs & Reynolds, 2001; Ross, 1998; Woolfolk Hoy & Davis, 2006).

A vast amount of research points at the central role of teachers' self-efficacy, usually defined as 'their belief in their ability to have a positive effect on student learning' (Ashton, 1985, p. 142), in teaching competence and teaching effectiveness (Tschannen-Moran & Woolfolk Hoy, 2001; Woolfolk Hoy & Davis, 2006). According to Bandura (1997) and Woolfolk Hoy and Burke-Spero (2005), teacher self-efficacy may be most malleable during teacher preparation and the first years of teaching. Paying attention to the development of a strong sense of efficacy among novice teachers and student teachers seems to be worthwhile, because once established the self-efficacy of experienced teachers seems resistant to change (Woolfolk Hoy & Burke-Spero, 2005). Social cognitive theory (Bandura, 1997) claims that teachers' self-efficacy can be created by four main sources of

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information, namely enactive mastery experiences, vicarious experiences, verbal persuasions and physiological and affective states. Research in higher education (see e.g. Palmer, 2006; Van Dinther, Dochy, & Segers, 2011) evidenced the relevance of these sources for improving students' self-efficacy. Nevertheless, the way students select and interpret the information derived from these sources is an unexplored area in self-efficacy research.

Formative assessment, which refers to assessment that specifically intends to generate feedback on students' achievements to improve student learning (Nicol & Macfarlane-Dick, 2006; Sadler, 1998), has the potency to provide students with several types of self-efficacy information. Recent research results reveal (Van Dinther, Dochy, Segers, & Braeken, 2014) that student perceptions of formative assessment do predict student self-efficacy. Particularly student perceptions of the form authenticity aspect, i.e. the resemblance of assessment to the future teaching profession (Gulikers, Bastiaens, & Kirschner, 2006) and the quality of feedback showed to be the best predictors. The influence of this type of perceptions confirm, as stated by social cognitive theory (Bandura, 1997; Britner & Pajares, 2006), the essential role that enactive mastery experiences and verbal persuasions play in building students self-efficacy beliefs. However it is not yet clear how in students' experiences these assessment characteristics contribute to their self-efficacy.

Among researchers investigating educational contexts there is an international and lasting interest in the role self-efficacy plays in the learning process (Kleinsasser, 2014). Considering the state of the art in self-efficacy research and the relevance of providing student teachers with a strong self-efficacy, the purpose of this paper is to study in-depth how student teachers' assessment experiences contribute to their self-efficacy.

2. Student teachers' self-efficacy

The idea that teachers' beliefs about their capabilities as teachers are of interest, has been studied for several decades. Teachers' self-efficacy is a special type of self-efficacy which refers to '*beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments*' (Bandura, 1997, p. 3). Within the educational field, the meaning and measure of teachers' self-efficacy has been the focus of many research studies. Teacher self-efficacy is usually defined as "teachers' beliefs in their ability to have a positive effect on student learning" (Ashton, 1985, p. 142) or as "a judgment of his or her capabilities to bring about desired outcomes of student engagement and learning, even among those students who may be difficult or unmotivated" (Tschannen-Moran & Woolfolk Hoy, 2001, p. 783). There is a considerable amount of research findings pointing at its central role in teaching competence. For example, regarding classroom management, highly efficacious teachers incline to less controlling and more humane behaviour in handling their students than less efficacious teachers (Chacon, 2005; Woolfolk & Hoy, 1990; Woolfolk, Rosoff, & Hoy, 1990). Regarding instruction, compared to less efficacious colleagues, highly efficacious teachers are apt to divide the class for small group instruction and direct teaching (Gibson & Dembo, 1984; Muijs & Reynolds, 2001), spend more time in interactive instruction (Smylie, 1988) and demonstrate higher levels of planning and organisation (Allinder, 1994). Furthermore teachers' self-efficacy is frequently associated with student educational outcomes. For example Caprara, Barbaranelli, Steca, and Malone (2006) found, controlling for previous levels of achievement that teachers' self-efficacy affected student academic achievements in a positive way. Concerning reading skills (Ross, 1998) and mathematics (Muijs & Reynolds, 2001; Ross, 1998), researchers demonstrated that students guided by teachers with high self-efficacy performed

better than students guided by less efficacious teachers. Considering this substantial amount of research findings, it seems important for prospective teachers to develop a robust self-efficacy. However, cross-national research (Jensen et al., 2012) revealed that new teachers reported significantly lower levels of self-efficacy than experienced teachers.

Referencing the target group of this study, student teachers, Bandura (1997) states that their self-efficacy is most pliable at an early stage of the learning process. Students who enter the first year of the teacher educational programme have an early global or general idea of teaching and teaching competences. This early global concept is based on prior knowledge, teaching experiences drawn from their student role and, in general, very limited or no teaching experience as a teacher. First year student teachers encounter new teaching experiences, they interpret these experiences and that forms a new and better understanding of the teaching practice and required teaching competences. In line with Schunk and Meece (2006) who state that students' school experiences help shape their self-efficacy beliefs, it is plausible that the development of teacher competences runs parallel with the development of first year student teachers self-efficacy. This implies, according to the theoretical assumption of Eccles, Wigfield, and Schiefele (1998), that first-year student teachers enter the first-year programme with a more global undifferentiated teacher self-efficacy. As students have more teaching experiences a differentiation takes place from a broad understanding to a partly differentiated self-efficacy (Van Dinther, Dochy, Segers, & Braeken, 2013), finally leading to a more fine-grained sense of teacher efficacy (Duffin, French, & Patrick, 2012; Poulou, 2007).

According to social cognitive theory (Bandura, 1997; Tschannen-Moran & Woolfolk Hoy, 2007) students develop their self-efficacy by interpreting information from four sources: enactive mastery experiences, vicarious experiences, verbal persuasion and physiological and emotional states. Enactive mastery experiences are the most powerful source of self-efficacy information and refer to authentic successes in carrying out particular tasks within particular situations. In general, experiences interpreted as successful raise students' self-efficacy and experiences interpreted as unsuccessful lower it. Next to this source, self-efficacy appraisals are partly affected by vicarious experiences, which refers to observational experiences provided by social models. Verbal persuasion and allied types of social influences serve as the third source of strengthening self-efficacy beliefs, by expressing faith in one's capabilities through encouragement and evaluative feedback. In the construction of self-efficacy beliefs, students rely partly on indicators of e.g. excitement, tension and stress transferred by physiological and affective states. This forms the fourth source of efficacy information.

Self-efficacy information that arises from these sources does not affect self-efficacy directly because it is cognitively appraised. This cognitive appraisal involves the selection of the type of information which students use from the different sources, as indicators for self-efficacy. Furthermore it involves the rules students use to weigh, interpret and integrate the self-efficacy information into creating their self-efficacy. This inferential process goes along with personal and situational factors such as previously created self-efficacy beliefs, perceived task difficulty, effort spent, support received during the task and the outcome of the task (Bandura, 1997; Britner & Pajares, 2006).

In the 1980s researchers started to examine the potency of these sources of self-efficacy information by investigating the situational and instructional factors within educational contexts that could possibly affect students' self-efficacy. The results within the elementary and secondary school settings demonstrated that factors such as goal setting (see e.g. Schunk, 1996), modelling (Relich, Debus, & Walker, 1986), feedback (Schunk, 1995), task strategies

(Pintrich & De Groot, 1990) and self-monitoring and self-evaluation (Zimmerman & Kitsantas, 1999), can enhance students' self-efficacy in several ways. Since the 1990s studies referencing the same subject emerged within higher education. Review results (Van Dinther et al., 2011) revealed that educational programmes based on social cognitive theory are successful in improving students' self-efficacy and several factors influencing students' self-efficacy provided evidence for the potency of the main sources of self-efficacy information. Regarding enactive mastery experiences, stated by Bandura (1997) as the most powerful source of self-efficacy information, a lot of educational programmes emphasise the amount of practical experience, i.e. the time students spent in performing a task while applying knowledge and skills within demanding situations (Van Dinther et al., 2011). However not every direct practical experience itself leads in students' interpretations to a mastery experience. With respect to vicarious experiences as second source of efficacy information, the results of former studies were inconclusive. Verbal persuasion, as the third source of efficacy information, is mostly captured by providing student with performance feedback. However there are several questions regarding the differing effects of different types of feedback on student self-efficacy, for not every type of feedback does in fact reflect the encouraging message, as theorised by social cognitive theory (Usher & Pajares, 2009).

Although there is evidence that student teachers' self-efficacy increases during teacher training programmes (Wenner, 2001; Woolfolk Hoy & Burke-Spero, 2005), it is still largely unclear how student teachers deal with the different self-efficacy sources. For example, which level of authenticity leads to a mastery experience? Is this level different for students in different phases of the programme? Which type of feedback in which situation is interpreted by students as encouraging regarding their capabilities? There is a need for a better understanding of the role the sources of self-efficacy play and a deeper insight in the way student teachers select and interpret the information from these sources.

3. Increasing student teacher self-efficacy through assessment

It is widely accepted that assessment has an influence on how students learn and scholars have put forward the importance of student perceptions of two specific characteristics of assessment in students' learning, namely authenticity (Gulikers et al., 2006; Gulikers, Bastiaens, & Kirschner, 2007; Janssens, Boes, & Wante, 2002; Sambell, McDowell, & Brown, 1997) and feedback (Gibbs & Simpson, 2004; Higgins & Hartley, 2002; Segers, Gijbels, & Thurlings, 2008). Formative assessment refers to assessment that specifically intends to generate feedback on students' achievements to improve student learning (Nicol & Macfarlane-Dick, 2006; Sadler, 1998). Formative assessment has a positive impact on students' learning outcomes (Black & William, 1998; Hattie & Timperly, 2007), because it concentrates on improving students' learning in terms of learning gains, student motivation and student self-efficacy (Black, Harrison, Lee, Marshall, & William, 2003).

Feedback can be considered as a persuasive source of efficacy information and according to Schraw, Crippen, and Hartley (2006) feedback can enhance students' self-efficacy if it provides information about whether the task has been performed acceptably as well as how to improve subsequent performance. This is in line with research pointing at instructional factors within higher education such as feedback that can enhance students' self-efficacy (Palmer, 2006; Van Dinther et al., 2011).

Authenticity of assessment, refers to the use of assessment tasks representative of the real-life and meaningful problems occurring in the professional occupational domain and which require the same competences and thinking processes experts use to solve domain-specific problems (Ritzen & Kösters, 2002; Segers, Dochy, & Cascallar, 2003). The portfolio assessment process, investigated in this study, consists of three phases. In particular the assessment tasks in the direct preparation phase and the portfolio assessment interview phase can be regarded as authentic. During the direct preparation phase students have to compose a reflective portfolio, which includes collected evidence regarding their teaching activities and experience in the professional practice, a self-appraisal regarding the competence development, reflective comments on collected feedback provided by important referents and a reflection regarding prospective learning goals and activities (Segers et al., 2008; Smith & Tillema, 2003). Next to this, in the portfolio interview phase, students are interviewed by two assessors and assessed on the integration of required knowledge, skills and attitudes referencing the teacher competences. Finally, in the feedback phase students receive feedback from the assessors on their teacher competence development. Student perceptions of authenticity of assessment refer to how practice-oriented assessment is perceived by students (Gulikers et al., 2007). Since practice-oriented learning experiences can be seen as a necessary condition for gaining mastery experiences (Palmer, 2006; Van Dinther et al., 2011), the assessment characteristic authenticity can be connected with this source of creating self-efficacy.

Recent research reveals (Van Dinther et al., 2014) that student perceptions of assessment practices positively influence their self-efficacy, and particularly student perceptions of the 'form authenticity' aspect and 'the quality of feedback' aspect demonstrated the strongest influence. However not every practice-directed assessment result itself leads automatically to a mastery experience and not every type of feedback given leads to enhancement of students' self-efficacy. Therefore this study intends to provide clarity about how students experience these assessment characteristics and how in students' experiences these assessment characteristics contribute to their self-efficacy.

The current study is of an explorative and qualitative nature and aims to investigate in depth how student teachers' assessment experiences contribute to their self-efficacy. According to the aim of this study we try to answer the following research questions:

1. How do students' assessment experiences regarding the authenticity aspect contribute to their self-efficacy?
2. How do students' assessment experiences regarding the feedback given contribute to their self-efficacy?

4. Method

4.1. Participants

A qualitative study was set up to provide in-depth information about students' assessment experiences. Participants in this study were second year students, enrolled in a 4-year bachelor programme for elementary teacher education, who completed a formative assessment. From the angle of the credibility of the study capturing a wide variation of experiences, we intended to purposefully invite (Johnson & Christensen, 2012) both female and male students, students with different views on assessment (i.e. positive as well as negative views) and students differing regarding the assessment results with sufficient as well as not sufficient competence development. The professional staff of the study setting identified, among 450 s year students, potential respondents and invited 15 student teachers. All 15 student teachers agreed to take part. The mean age of the purposive sample was 19.4 year, including 12 female participants and 3 males, which reflects the actual situation within this elementary teacher educational institute.

In relation to the ethics of the study, all participants were, when invited, fully informed about the purpose of the study and the methodology and this information was repeated at the beginning of the interviews. All students, being aware of their entirely anonymous and voluntary participation, gave their consent. The interviews concern self-efficacy, a sensitive issue especially for students that have not developed sufficient levels of competence. To prevent participants from any potential emotional harm, the interviewer was alert to the emotional intensity during the interviews, and instructed to determine whether or not to interrupt or temporarily stop the interview. Finally, as the interviews were recorded, each participant was explicitly advised at the start of the interview of the possibility to stop the audiotape at any time.

4.2. Setting and procedure

The setting for this study is a large Dutch institute for elementary teacher education, with more than 2000 students. At the end of the first year of the competence-based teacher educational curriculum, a formative competence assessment is used to monitor student competence development and to serve as a preparation for the final evaluation. This formative competence assessment consists, as described in Section 3, of a portfolio assessment process with three phases.

The students in our research were interviewed at the beginning of their second bachelor year, a couple of months after they had finished the formative competence assessment.

4.3. Interview protocol

The interviews were administered individually by a researcher who is an expert in this research subject and not affiliated to this institute. The familiarity of the interviewer with the topic of research created the possibility for delivering in-depth questions if students' answers gave rise to that, whereas the external position created a more open atmosphere in which students were invited to answer as openly and critically as possible. The interviews lasted between 30 and 35 min and followed a standardised open-ended structure, i.e. a set of open-ended questions were asked in a specific order and exactly as worded. The standardised open-ended structure gives the researcher the possibility to deepen certain issues dependent on the answers of the participants while comparability of the answers is retained (Johnson & Christensen, 2012). When greater clarity or depth in answers was needed, the interviewer used probes and follow-up questions.

For the design of the interview scheme we took some statements from the questionnaires used in a former quantitative study (Van Dinther et al., 2014), as a starting position. More specifically we used statements, regarding student perceptions of the form authenticity aspect and the quality of feedback aspect, which have demonstrated the strongest influence on student teachers' self-efficacy (Van Dinther et al., 2014). Students were invited to react openly to these statements with their formative assessment experiences in mind (see the left side of Table 1 for an excerpt of used statements). The interview questions were aimed at eliciting responses regarding how students describe these assessment characteristics and if and how in students experience, these assessment characteristics contribute to their sense of efficacy (see the right side of Table 1 for an excerpt of interview questions).

4.4. Coding and analysis

The audio taped interviews were literally transcribed. The subsequent step was to define the unit of analysis which refers to the basis unit text to be classified during the thematic content analysis

Table 1
Excerpt from the interview protocol.

Starting point statements	Interview questions
This assessment is clearly aimed at the requirements of the teaching profession	When you think of your experience with the formative assessment: a) Was the assessment, in your experience, clearly aimed at the requirements of the teaching profession? b) If it was, can you explain why? c) If it wasn't, can you explain why not? d) Did such an assessment influence your self-efficacy as a student teacher? e) If it did, can you describe how? f) If it didn't, can you explain why not?
The feedback given at the end of this assessment helps me to improve my teacher competences	When you think of your experience with the feedback given: a) Did the feedback given, in your experience, help you to improve your teacher competences? b) If it did, can you explain how? c) If it didn't, can you explain why not? d) Did such feedback influence you're self-efficacy as a student teacher? e) If it did, can you describe how? f) If it didn't, can you explain why not?

(Zhang & Wildemuth, 2009). The unit of analysis in this study was a meaningful text segment, including a partial, single or several sentences, in which the students referred to the assessment characteristics authenticity or feedback, or the contribution of these assessment characteristics to student teachers' self-efficacy.

In order to analyse the data we used thematic content analysis. Thematic content analysis is a commonly used method in qualitative research which is related to grounded theory as well as phenomenology (Braun & Clarke, 2006; Guest, Mitchell, & Namery, 2012), and has been defined as 'a method for identifying, analysing and reporting patterns (themes) within data' (Braun & Clarke, 2006, p. 6). During the analysis we relied on an abductive strategy intending to obtain the most optimal understanding of the object of our study. Hence, interview data and theory were connected and repeatedly assessed in relation to each other (Morgan, 2007).

Following the standardised structure of the interview protocol, we conducted a three-step analysis in which an elaborated coding scheme was developed. The development of this coding scheme was supported by the use of written memos during the whole analytical process (Hsieh & Shannon, 2005; Miles & Huberman, 1994). To ensure the consistency of coding we defined the categories and subcategories. Text units were assigned to only one code. In general, student assessment experiences were coded as a theme if at least one student expressed the experience.

In the first analysis step, all text segments in which students refer to the assessment characteristics of interest, were coded into the categories 'authenticity' or 'feedback'. Subsequently, in this first step we focused on what the participants experienced, i.e. the different qualities of authenticity of assessment and feedback given. Data were further specified into qualities of authenticity and qualities of feedback.

At the beginning of the second analysis step, we selected all statements in which participants referred to the influence of this

assessment on their self-efficacy. Subsequently all text segments in which students refer to one of the sources of self-efficacy were selected. These last text segments were coded into the following four categories representing the main sources of self-efficacy, as described by participants by relying on social cognitive theory (Bandura, 1997) as introduced in the literature review:

a) 'Mastery experiences': including participants' statements about success experiences referencing the development of teacher competences,

b) 'Vicarious experiences': including participants' statements about observational experiences provided by other students or teachers,

c) 'Verbal persuasion': including participants' statements referring to information provided by the assessors that affirms and persuades students that they are able to further develop the teacher competences,

d) 'Physiological and affective states': including participants' statements about experiences regarding their physiological and affective mood states.

We completed this second analysis step by analysing participants' descriptions in which they connected the assessment characteristic 'authenticity' or 'feedback' with one or more sources of self-efficacy.

The third analysis step focused on what the participants experienced: a further specification of the described sources of self-efficacy into types of efficacy information in relation to the outcome of the first analysis phase i.e. the different authenticity and feedback qualities. The purpose of this step was to identify possible patterns of self-efficacy information as elicited by the assessment characteristics 'authenticity' and 'feedback'.

To validate and refine the coding scheme early in the analytical process, we tested the clarity and consistency of the definitions of the categories on a sample of the text, which were 20% of the interviews. Two coders were assigned to code the transcribed interviews. One of the two is an expert on assessment and social cognitive theory, the other coder is expert in teacher education. The two coders read and coded independently the sample and distinct statements pertaining to the categories. To achieve a high consistency among the coders, in a meeting the coding and coding experiences were discussed, which resulted in a collaborative refined and data-driven coding scheme. After that the coding was applied to the whole corpus of the texts. To maintain high consistency in terms of reliability, during this process two meetings were organised to discuss if new codes emerged and the coding categories needed to be modified. Discussion between coders of issues that arise during the analytical process refers to an iterative process that should be continued until sufficient coding consistency has been achieved (Schilling, 2006; Zhang & Wildemuth, 2009). Regarding the interrater reliability, after the first round in the analytical process a correspondence of 85% was reached. Prior to starting the final round in the analytical process coders negotiated until unanimous agreement was reached about the definite coding scheme (see Appendix).

The reporting of the findings and the drawing of conclusions of the coded data, will be addressed in the next sections. In order to increase the validity of the study, in the text of the result section several authentic participant's answers are provided (Elo & Kyngäs, 2007).

5. Results

We commence this result section with the qualities of 'authenticity' and 'feedback' as experienced by students. Before we describe which types of self-efficacy information were elicited by

these assessment characteristics, we reveal if a formative assessment with these characteristics does influence participants' self-efficacy. Finally we describe the results of our search, according to thematic content analysis, for relevant patterns, i.e. parts of the experiences that are common across the participants. Regarding the focus of this study this search was aimed at types of self-efficacy information across participants that had been elicited by the assessment characteristics of interest.

5.1. Qualities of 'authenticity' in students' experiences

The results suggest a variation in students' experiences with regard to the experienced degree of 'authenticity' and referencing the different qualities students attribute to 'authenticity'. Twelve of the fifteen students experienced the assessment as authentic, i.e. professionally relevant. In addition to this, from students' descriptions three qualities regarding assessment 'authenticity' emerged.

5.1.1. Reflection on development

Seven students experienced reflection on their competence development during preparation of the portfolio as authentic. This reflection on competence development involves activities such as thinking back on their experiences, analysing their activities, judging their own acting and collecting evidence for their competence development. Students explain in several ways why they view this preparation task as professionally relevant. (a) Three participants refer to their internship, as representing the professional practice for them. This is not surprising because for most first year students this internship is their frame of reference. Because the reflection task is about their internship activities these students experience it as professionally relevant. (b) Due to the focus on the professional standards i.e. teacher competences, two students perceive the task as being aimed at their future profession and as corresponding with the requirements of the practice. (c) Next to this, two students view reflection as an activity that belongs to teachers' profession. For instance, one of these students described:

> Yes, it does connect with elementary education. Especially, last year I realised that when I had to type those reflection reports and those standards, all those points that you had to reflect on, this I had already come across during my internship and I did give those lessons. Those things often appeared in my internship so it connects to the practice. (S4, U3)

5.1.2. Addressed as a future teacher

Ten students experience the portfolio assessment interview as authentic. In their experiences the assessors asked questions concerning their personal vision on teaching situations, their teacher competence development, evidencing their development and about putting theory into practice. Students explain in two ways why they view this portfolio assessment interview as authentic. In a part of the descriptions the students mention that the type of questions were questions that could be asked in the real practice, in their perception this kind of questions can be asked in the future when they work as a teacher. In the other descriptions the participants express that due to the attitude of the assessors and the type of questions, they were stimulated to have a large share in the conversation and were given the opportunity to lead a part of the interview. These participants felt themselves addressed as an adequate interlocutor. For instance, one of the students described:

> I did a lot of the talking and they put plenty of questions to me about things I hadn't prepared and didn't expect. I think this corresponds with the profession, because in the future when you have

to answer questions from parents and from colleagues you don't always know the answers in advance. (S7, U15)

Another student expressed:

Yes, we also talked about my vision, and I could lead the interview in the direction of my interests, so I could talk a lot about my personal vision and experience-directed education when I did my internship. (S13, U21)

5.1.3. Degree of reality

Five students describe the authenticity of the assessment in general by referring to the degree of reality of the assessment. These students made statements about the degree of reality by comparing the assessment activities with actual internship activities or future professional activities and requirements. Although two of these participants described the assessment as real because it is aimed at the professional requirements, three described the assessment as not real enough. The latter experience the assessment as verbalising what they do in practice. The assessment itself does not take place in the practice itself and it does not include an observation of their activities during their internship, in their view they were assessed with so-called second hand information. These participants questioned the degree of reality of the assessment and they favour a hands-on assessment in the practice itself. One of them described the degree of reality with the following statement:

You work things out and you show it to them, so it becomes clear what you did but if really … if you really can show what you did in your internship, I doubt that. You have to demonstrate a three minute video and of course you can explain things but I don't think I can really show it this way. (S11, U27)

5.2. Qualities of 'feedback' in students' experiences

The results suggest a variation in students' experiences regarding the 'feedback given' and referencing the different qualities students attribute to the feedback. Thirteen students experienced the 'feedback given' as supporting the further development of their teacher competences. Furthermore three qualities regarding feedback given emerged from student's expressions.

5.2.1. Balanced feedback

Ten students expressed that feedback supports their competence development when it balances between clarifying the things that go well and the things that need improvement. For these students it seems relevant that assessors not only focus on their failures but also pay positive attention to their strengths and progression. In students experiences this 'balanced feedback' consists of positive feedback i.e. affirming comments about what goes well combined with feed forward which identifies weak aspects of students performance and providing suggestions for improvement. One participant expressed 'balanced feedback' as follows:

…but it has to do with the positive and the negative feedback…it was not quite right, but they gave me a compliment and suggested you could improve this or that but in general it all looks quite good; instead of this and that isn't right and you have to improve all this. (S14, U37)

In addition to this, two students describe two types of unbalanced feedback: negative feedback only and positive feedback only.

In their view only positive or negative feedback is not helpful and not complete. This 'unbalanced feedback' provides them with nothing to go on to improve and does not encourage taking a next step. These students expressions reveal a lack of something to go on in terms of improvement which forms an essential part of what other students experience as balanced feedback. One of these participants expressed this as follows:

…but the feedback they gave me then, was…it is not good enough and you have to do it (authors: reflection reports) again, but how? How do I start? (S15, U39)

5.2.2. Recognisable feedback

Five students expressed that feedback supports their competence development when it is 'recognisable feedback'. For these students feedback needs to connect with their own expectations, feedback is useful when it is as expected and when it affirms their self-view or the self-judgements they have about their own development. One participant expressed 'recognisable feedback' as follows:

Yes, and when you get feedback about which you've already thought yourself in advance, I have to improve this and I've already planned that to improve so this is covered. You get feedback of which you think, oh yes that's my own point of view. (S5, U40)

5.3. The influence of formative competence assessment on students' self-efficacy

Before answering the question how 'authenticity' and 'feedback' can influence students' self-efficacy, it is relevant to determine for which students this assessment did in fact influence their self-efficacy. Students varied in their answers to this question. Ten students stated that the formative assessment did positively influence their self-efficacy. From these descriptions, a new theme, namely 'meeting the standard', emerged. Twelve students mentioned that in relation to their self-efficacy the outcome of the formative assessment is of interest. They expressed that achieving a positive result i.e. a sufficient development of their competences positively influences their self-efficacy by providing an experience of success, of mastery. Although the intention of this formative competence assessment is to improve students' learning by emphasising the next step, it appears that students attach great importance to a positive result in terms of 'meeting the competence standard' in relation to their self-efficacy. One participant expressed the following:

What they wrote on that competence form, it was all positive and I had made good progress, it felt as a success. That gives you self-confidence. (S1, U45)

Furthermore, two students answered that the formative assessment did not influence their self-efficacy. One of these students experienced the assessment as not 'authentic' by questioning the degree of reality. The other student did not 'meet the standard' i.e. of achieving a sufficient competence development and expressed that it did not influence her self-efficacy because it affirmed her own expectation. Two other students stated that the formative assessment did not raise or lower their self-efficacy, it affirmed their actual level of self-efficacy. One of these students also experienced the assessment as not 'authentic' by questioning the degree of reality, the other expressed that she entered the

assessment with an already robust sense of efficacy. Another student not 'meeting the competence standard', mentioned that the formative assessment felt as a failure which negatively influenced her self-efficacy. Explaining the negative impact in self-efficacy this student included also the unexpectedness of the result and the associated feedback as negative only.

Answering the question how 'authenticity' and 'feedback' can influence students' self-efficacy, we analysed all students descriptions regarding the sources of self-efficacy. The first analysis result pointed out that students mentioned three of the four sources of self-efficacy namely: mastery experiences, persuading experiences and physiological and emotional experiences. Vicarious experiences as fourth type of efficacy information was not described by students.

In a further examination we searched for a connection between 'authenticity', 'meeting the standard' and 'feedback' with one or more of these three sources of self-efficacy. A connection would mean that when students expressed that an assessment characteristic elicited a type of experience that belongs to one or more of the sources of elf-efficacy, we made it visual in Table 2 by depicting an 'X ' on the crossing of an assessment characteristic and a source of self-efficacy.

Fourteen students mention mastery experiences or verbal persuasions as main experiences elicited by these assessment characteristics, seven students describe both of these experiences as elicited. The main experiences that are elicited by 'authenticity of assessment' and 'meeting the standard' are mastery experiences. The main experiences that are elicited by 'feedback' are persuading experiences. Ten students express that these mastery experiences and verbal persuasions are accompanied by physiological and affective experiences. In the next section we further examine these sources of self-efficacy information and we will provide several examples.

5.4. Types of efficacy information in formative competence assessment

The portfolio assessment procedure in this setting consists of three phases: the direct preparation phase, the interview phase and the feedback phase. The outcome of the first phase of analysis i.e. most of the 'authenticity' and 'feedback' qualities as experienced by students, can easily be placed within these assessment phases. The authenticity quality 'reflection on development' is part of the direct preparation phase and the other authenticity quality 'addressed as a future teacher' refers to the portfolio assessment interview phase. The theme 'meeting the standard' and the feedback qualities 'balanced feedback' and 'recognisable feedback', all belong to the feedback phase.

In this section the results of a further specification of students descriptions of the sources of self-efficacy, related to the phase in the portfolio assessment procedure, will be presented. These results include several new subcategories belonging to mastery and persuading experiences. In Table 3 we depict which types of

Table 2
Overview of the connections between assessment characteristics and sources of self-efficacy.

Sources of self-efficacy	Assessment characteristics		
	Authenticity of assessment	Meeting the standard	Feedback given
Mastery experiences	X	X	
Vicarious experiences			
Persuading experiences			X
Physiological/affective experiences	X	X	X

Table 3
Overview of the connections between assessment phases and types of efficacy information.

Types of efficacy information	Phases of portfolio assessment		
	Direct preparation phase	Interview phase	Feedback phase
Mastery experiences			
- Mastery-after-action experiences	X		
- Mastery-in-action experiences		X	
- Milestone-mastery experiences			X
Persuading experiences			
- Affirming experiences			X
- Clarifying experiences			X
Physiological/affective experiences			
- Affective states	X	X	X

efficacy information can be connected with the above-mentioned three portfolio assessment phases. A connection means that according to students' expressions a portfolio assessment phase elicits an experience that belongs to one of more types of efficacy information. In Table 3 we make this visual by depicting an 'X ' on the crossing of a portfolio assessment phase and a type of efficacy information. The new subcategories related to mastery and persuading experiences that are visualised in the column 'Types of efficacy information', will be explained in the following subsections; furthermore a characteristic expression for every new type of efficacy information will be provided in Table 4.

5.4.1. Direct preparation phase

Six students describe that the assessment preparation task including a self-judgement of their competence development, created an awareness of the activities they had undertaken and the tasks they performed during their internship. Because they had to judge themselves against the requirements of the first year programme, they became conscious of the reason why things went well, namely that their performance met the standard i.e. the teacher competences. These self-judgements elicit during the assessment preparation a consciousness about results in the past, leading to a sense of mastery some time after the teaching

Table 4
Characteristic expressions of new types of efficacy information.

New types of efficacy information	Characteristic expressions
Mastery experiences	
- Mastery-after-action	I discovered that, without knowing, I learned more than I had thought. When you look from the beginning until the end and tell about it, you see that there is fortunately an upward trend: an improvement. And that feels really as some kind of success.
- Mastery-in-action	Yes, that interview went rather well, I could answer those questions and I could explain my vision, for me it was more like a conversation.
- Milestone-mastery	For me it was a milestone when I sensed I have it in me, I really can and I can move on.
Persuading experiences	
- Clarifying experiences	I really did get a clearer view of myself. If you have a clear view about how you have to improve through that feedback, it becomes clear to you what you have to work on, after that feedback I felt more certain.
- Affirming experiences	Of course, I know my own strong and weak points but when you also get this affirmation from these assessors then you know I do this and it is really true that I am good in this and not so good in that.

experiences during the internship. These descriptions relating to awareness and consciousness can be seen as belonging to mastery experiences, and are here labelled as 'mastery-after-action experiences' as type of self-efficacy information. One student expressed this 'mastery-after-action experience' as follows:

I discovered that I, without knowing, had learned more than I had thought. When you look from the beginning until the end and then you tell about it, you see that there is fortunately an upward trend: an improvement in what you did. And that feels really as some kind of success. (P10, U83)

Another student expressed it as follows:

But when you finally finish these (authors: competence reports), you have sorted out for yourself what you did and that things went well. And yes, as I already said, that is rather positive and you are proud of it. (P14, U85, U114)

The student in the second example expresses next to the 'mastery-after-action experience' a feeling of pride, which we labelled 'positive affective experiences' as a type of efficacy information belonging to the source physiological and affective experiences.

Some of the students mentioning 'mastery-after-action' experiences also expressed that they were well prepared through this reflection task. The consciousness about what they had learned and achieved, provided them with self-confidence to enter the next phase of the portfolio assessment, the interview phase.

5.4.2. Portfolio assessment interview phase

Eight students describe that being 'addressed as a future teacher' during the portfolio assessment interview elicited experiences of success while they were interviewed. Students describe these types of successes as small and concrete performances at the time of the interview itself. More concretely, students refer to being a conversation partner to the assessor, being able to answer questions of the assessors, which affirmed being successful in dealing with the assessment interview. These 'I could…' statements can be seen as belonging to mastery experiences and are here labelled as 'mastery-in-action experiences' as a type of self-efficacy information. Three participants expressed these experiences as follows:

Yes, that interview went rather well, I could answer those questions and I could explain my vision, for me it was more like a conversation. (S5, U89)

Yes, I knew what I was talking about, and then you continue and you think, okay, let the next question come. (S13, U92)

I could answer these questions using my experience and yes for me it did not feel as if I was under pressure…. (S2, U86, U105)

As can be seen in the third example this student experiences, next to a 'mastery-in-action experience', a no feeling of pressure, belonging to the self-efficacy source physiological and affective experiences, which we labelled as 'affective experiences'.

5.4.3. Feedback phase

The feedback phase elicited among thirteen students mastery experiences or persuading experiences and for three students this phase elicited mastery experiences as well as persuading experiences.

Eight students describe that meeting the standard elicited mastery experiences expressed as 'Yes I can and I can move on'

experiences. These thoughts can indicate several things, for some students this experience leads to the conclusion that this profession suits them, for others it means that they are on the right track, including that their learning activities are appropriate and that they can continue. For these students this experience serves as an indicator of their capability to become a teacher, it serves as a milestone for their future learning activities. This 'Yes I can and I can move on' thoughts belonging to the mastery experiences, are here labelled as 'milestone-mastery experiences' as a type of self-efficacy information. Participants described this as follows:

For me it was a milestone when I sensed I have it in me, I really can and I can move on. (P2, U75)

Another student expressed:

Yes, that was really an experience of success because it gave me a positive feeling, I can just move on or yes, it goes well so I can just move on, or yes, a step higher to the next year, that gave me an experience of success. (P1, U72)

Nine students experienced 'balanced feedback' and 'recognisable feedback' as a type of social persuasion, more concretely as 'affirming' or as 'clarifying'. Four students who reported feedback as a 'clarifying' experience entered the assessment with no clear view of their development and a growing understanding of the teaching practice and requirements. The received feedback provides them with a clearer self-image and a better view on their development, it clarifies their strong and weak points. It gives them a better understanding of the teaching practice and the requirements. For these students clarifying feedback offers them something to hold on to. Two students expressed this in the following way:

I really did get a clearer view of myself. If you have a clear view about how you have to improve through that feedback, it gets clear to you where you have to work on, after that feedback I felt more certain. (S8, U101)

When it goes well but you haven't got wind of what you have to improve, through their comments you get clear what your weak points are. (S11, U102, U112)

As can be seen in the first example this student experiences in addition to a clearer overview also a feeling of certainty, belonging to the self-efficacy source physiological and affective experiences, which we labelled as 'affective experiences'.

For five other students this feedback affirms their own thoughts and confirms the self-judgements they made preceding the assessment, in other words it corroborates their self-view. Such an experience is typically reported by students who had entered the assessment interview with a clear view on their development. These students are more or less aware of their capabilities and the points that need improvement and they have a developed understanding of the teaching practice and the requirements. These students express the need to confirm that their self-image is realistic in relation to the requirements of the teaching profession. One student expressed this as follows:

Of course, I know my own strong and weak points but when you also get this affirmation from these assessors then you know I do this and it is really true that I am good in this and not so good in that. (S1, U94)

'Clarifying' experiences' as well as 'affirming experiences' persuade students that they have the capabilities to become a

teacher and that they are able to further develop their teacher competences. For the students who experience this feedback as 'clarifying' it simultaneously provides them a mirror through which they can develop a clearer self-image. For the students who experience this feedback as 'affirming' this feedback provides them with the confidence to rely on their self-knowledge in the future. These encouraging experiences belonging to verbal persuasion experiences, are here labelled as 'affirming experiences' and 'clarifying experiences' as types of efficacy information.

6. Conclusions and discussion

For teacher educational institutes, creating possibilities for students to build a robust sense of teacher efficacy, is of utmost importance. In this respect, programmes should offer opportunities for mastery, persuading and physiological and affective experiences. The assessment practice is powerful tool for reaching this goal. However, to date it has not been clear how student teachers' assessment experiences contribute to their self-efficacy. For that reason the purpose of this research was to obtain an in-depth view on the ways in which student teachers' assessment experiences contribute to their self-efficacy.

Regarding the 'authenticity' of assessment, most students experienced the assessment as professionally relevant and described 'authenticity' of assessment with qualities as 'reflection on development', being 'addressed as a future teacher' and 'the degree of reality'. Regarding the other assessment characteristic of interest, 'feedback given', most students experienced feedback as supporting their competence development if it was 'balanced' or 'recognisable'. These two feedback qualities are in line with Hattie and Timperly (2007), who stated that feedback must provide answers to reduce discrepancies between current and desired performances. The feedback quality 'balanced feedback' matches Ferguson's (2011) findings regarding the balance between supportive and critical feedback comments.

6.1. Research question 1

In response to our first research question students describe that 'authenticity' of assessment exerts influence on their self-efficacy through the authenticity qualities in the direct preparation phase and the interview assessment phase. More specific, 'reflection on development' raises students' self-efficacy during the direct preparation phase by eliciting 'mastery-after-action experiences' and being 'addressed as a future teacher' during the assessment interview, positively affects students' self-efficacy by eliciting 'mastery-in action experiences'. These findings illustrate the results of a former study (Van Dinther et al., 2014). Furthermore, 'addressing student as future teachers' and 'reflection on development' are in line with the characteristics of the competence based approach (Ritzen & Kösters, 2002; Struyven & De Meyst, 2010). The latter can also be connected with the agentic perspective of social cognitive theory (Bandura, 1997) which includes among other things self-reflection, referring to self-referent thinking processes in which students monitor, evaluate and modify their actions and thoughts. In this respect, some students questioned the 'authenticity' of assessment. These students favour being assessed while performing in practice instead of being assessed on verbalising what they had done in practice, in their opinion the latter does not provide successes that are real enough, in other words no full enactive mastery experiences. A possible explanation for this could be, that given the differences between student and teacher authenticity perceptions (Gulikers, Bastiaens, Kirschner, & Kester, 2008), for these students the authenticity of the portfolio assessment tasks was not communicated explicitly by teacher educators.

6.2. Research question 2

With reference to our second research question, students mention that 'feedback given' exerts its influence on student self-efficacy in the feedback phase of assessment. More specific, when assessors provide students with 'balanced feedback' or 'recognisable feedback' students' self-efficacy is positively influenced by eliciting 'affirming' and 'clarifying' experiences. These findings are in line with the results of a former study (Van Dinther et al., 2014). Furthermore, it illustrates Bandura's (1997) statement that evaluative feedback given in the early stages of students' skill development and underlining their capabilities has a notable influence on the development of students' self-efficacy. The thematic content analysis results regarding feedback revealed a new theme namely 'meeting the standard'. It appeared that, although formative assessment focuses on improving students' learning by emphasising the next step, students attach great importance to a positive result in terms of meeting the competence standard in relation to their self-efficacy. Students expressed that meeting the competence standard enhances their self-efficacy through 'milestone-mastery experiences'. This is in line with the combined use of progress and discrepancy feedback as stated by Voerman, Meijer, Korthagen, and Simons (2012).

6.3. Overall conclusions

At first, the results of this study highlight that the assessment characteristics 'authenticity' and 'feedback given' exert mainly a positive influence on student teachers' self-efficacy during different phases of the portfolio assessment in competence based teacher education. This positive influence on most students' self-efficacy, illustrates previous research findings regarding the influence of assessment on student self-efficacy (Van Dinther et al., 2014) and is in line with assessment research results regarding the value of formative assessment for student learning (see e.g. Black & William, 1998; Sadler, 1998; Segers et al., 2003). This may appear not surprising, since a lot of the students met the competence standard and mentioned this as relevant for their self-efficacy. Nevertheless, it appeared that students' self-efficacy is not only influenced by the assessment outcome but it is affected in all three phases of the formative portfolio assessment. In this respect, one student mentioned that the assessment did negatively influence her self-efficacy by not meeting the competence standard and indicated the unexpectedness of the outcome. The other student not meeting the competence standard expressed that it did not influence her self-efficacy because it affirmed her own expectation. This connects with 'recognisable feedback' mentioned by some students as a feedback quality. However, when feedback given in assessment is in accordance with students' expectations, it does not refer to a quality of feedback given in assessment but it refers to other factors such as the clarity and amount of feedback given during the preceding educational programme and to student characteristics including their attention to and acceptance of feedback (William, 2011).

Secondly, thematic content analysis results exposed that students' self-efficacy can be affected by several types of self-efficacy information connected with these portfolio assessment phases and provided a fine-grained view on the types of self-efficacy information. This revealed a possible differentiation of mastery experiences and verbal persuasion into respectively several kinds of success experiences and distinct kinds of verbal persuasion experiences. With regard to mastery experiences, students can experience a sense of mastery in different ways, a) reflecting on tasks performed in the past, b) while performing a task and c) at the outcome of a task. We labelled these types of self-efficacy

information as 'mastery-after-action', 'mastery-in action' and 'milestone mastery' experiences. It appeared that formative portfolio assessment procedure has the capacity of influencing students' self-efficacy by eliciting this different types of mastery experiences during the three phases of the assessment. Referencing verbal persuasions students can feel encouraged in two ways: a) by acquiring a clearer self-image and a better view of their development (clarifying experiences) or b) by being affirmed in their self-judgement (affirming experiences). Mentioning 'clarifying' or 'affirming' experiences seems to depend on differences between students in self-view and understanding of the teaching practice, which refers to differences in competence development between first year students. The different kinds of verbal persuasions refer to the feedback phase of assessment. Several students describe that the above-mentioned types of self-efficacy information are accompanied by affective experiences, belonging to the fourth self-efficacy source. Most of them, with one exception, described positive affective experiences. Students mentioned no physiological experiences, which is in line with social cognitive theory (Bandura, 1997) which states that physiological indicators of efficacy mostly are reported in self-efficacy research regarding the health functioning domain and in activities requiring physical strength and stamina. Vicarious experiences were also not reported by students, the reason for this can be that this study focused on assessment. With regard to this setting, assessment is an individual activity, providing little opportunity to observe other students. These results together illustrate the potency of three of the four sources of self-efficacy as theorised by social cognitive theory (Bandura, 1997; Tschannen-Moran & Woolfolk Hoy, 2007; Usher & Pajares, 2009).

In general, our results correspond with earlier research regarding the potency of the main sources of self-efficacy and it provided more clarity of how identified factors influence students' self-efficacy. With regard to the relevance of self-efficacy for prospective teachers, it would seem possible to pay attention to the development of self-efficacy as part of the overall process for preparing students, with the use of characteristics of the competence based approach as authenticity and feedback.

6.4. Educational implications and limitations

Based on our research results we can formulate some implications for the design of assessment in teacher training programmes. Firstly, the capacity of formative competence assessment to positively influence students' self-efficacy, depends among other things, on designing authentic assessment tasks and on utilising assessors (provided) with necessary skills and attitudes.

Secondly, considering the gains for student teacher efficacy and competence development, teacher educators must encourage their students to reflect on their competence development, more frequently — at several moments during the programme — than just during direct assessment preparation.

Furthermore, the cyclical nature of feedback implies that within competence based teacher training programmes several feedback loops should be provided to monitor student teachers' competence development and to provide opportunities for building a robust sense of teacher efficacy. In general, a constructive alignment in teacher education between curriculum, assessment and student learning, not only supports student teachers' competence development but also their development of teacher efficacy.

This research has a few limitations. Because this study focused on two assessment characteristics, other assessment characteristics that could be of influence were not included. Further research can shed light on, for example, the extent to which assessment tasks are integrated in the learning environment (Gijbels, Van de Watering, & Dochy, 2005; Segers et al., 2008) and how this possibly

influences students' self-efficacy. Furthermore, possible differences in existing levels of self-efficacy among participants that could be of influence on how students experience the assessment characteristics, have not been taken into consideration. A follow-up investigation among the same target group applying a person oriented analysis strategy can take into account existing levels of self-efficacy in advance of the assessment, and can shed light on the processing of students' self-efficacy during the three assessment stages. Regarding the transferability of the results, we suggest replications of the study in other teacher training programmes as well as other programmes in higher education. Lastly, the results of this qualitative study can provide content for the construction of questionnaires regarding sources of self-efficacy to be used in quantitative research.

Appendix

Coding scheme

Category	Subcategory	Number of units
Authenticity of assessment	Reflection on development	7
	Addressed as a future teacher	15
	Degree of reality	5
Meeting the standard		12
Feedback given	Balanced feedback	10
	Unbalanced feedback	2
	Recognisable feedback	5
Self-efficacy	Positive influence	10
	No influence	2
	Affirming	2
	Negative influence	1
Mastery experiences	Mastery-after-action	6
	Mastery-in-action	8
	Milestone-mastery	8
Vicarious experiences		0
Persuading experiences	Clarifying experiences	4
	Affirming experiences	5
Physiological and affective experiences	Physiological experiences	0
	Affective experiences	14
Total number of units		116

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