

Student teachers' interpretations of the basis for teacher self-efficacy

Harri Pitkaniemi^{1} & Timo Martikainen²*

School of Applied Educational Science and Teacher Education¹,
Teacher Training School², University of Eastern Finland

The purpose of this study is to find out what kind of sources are behind student teacher self-efficacy based on student teachers' own interpretations. A key starting point for the study of sources is Bandura's social cognitive theory. It is important to know the content of these sources because self-efficacy has been found to be an important factor in the quality of teaching. A particularly noteworthy reason to study self-efficacy sources and their nature in teacher education is that the sources are in the process of being shaped and can be consciously influenced. The research participants were 25 student teachers in a Finnish teacher education context. Data were obtained through interviews, and were analysed using theoretical thematic analysis. The student teachers highly valued the experiences they had acquired themselves, and they were often linked to the emotions that strengthen them. For example, when a teacher notices that students are learning (even though there were difficulties at first), it brings pleasure to the teacher. Negative mastery experiences were sometimes associated with depression, but those negative experiences in the long run may also empower the teacher. Student teachers also made observations about other actors of teaching (and teacher education) and received comments from them. In practice, the source evaluation of those actors was hierarchical, with the supervising teacher and the school pupil being valued the most, and the peer teacher, i.e. the student teacher, being much less valued. The critical approach offered in teacher education and the general accompanying reflective "climate" in teaching practice will affect how feedback is – and should be – evaluated by a student teacher.

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* Corresponding author: harri.pitkaniemi@uef.fi

Introduction

Studies show that high self-efficacy in a teacher is a valuable trait worth pursuing. It is related to the features of the teaching process in many ways (e.g., Goddard & Kim, 2018; Lee, Chen, & Wang 2017; Perera, Calkins, & Part, 2019). According to a review by Zee and Koomen (2016), the findings suggest that teachers' self-efficacy beliefs show positive links with students' academic adjustment, teacher behaviour and practices related to classroom quality, as well as factors underlying teachers' psychological well-being such as personal accomplishment, job satisfaction, and commitment. Negative connections were found between teacher self-efficacy and burnout factors (see O'Brennan, Pas, & Bradshaw, 2017). According to both the theory of self-efficacy and empirical research, a teacher's high self-efficacy predicts, or is at least reasonably associated with student achievement (Klassen & Tze 2014; Klassen, Tze, Betts, & Gordon, 2011). However, one must not forget that teacher self-efficacy is not just a "product" but is essential to the further development of self-efficacy and interactivity in relation to the events of teaching and, in particular, the teacher's experiences of it.

The background of these studies can be traced to Bandura's (1997) social cognitive theory and its four sources of teacher self-efficacy: *mastery experience, vicarious experiences, social or verbal persuasion, and physiological and affective states*. According to the theory, a person's self-reflection has a profound influence on his or her subsequent behaviour, and beliefs concerning his or her own self-efficacy are usually more predictive of behaviour, motivation and feelings than earlier levels of performance. In their review article, Morris, Usher and Chen (2017) briefly describe that "Teachers' self-efficacy beliefs (i.e., teaching self-efficacy) are beliefs teachers hold about their capabilities to carry out their professional task" (p. 796). What kind of content a person reflects on and evaluates is essential for self-efficacy, as information is interpreted based on those four primary sources. Sources do not influence self-efficacy directly; instead, dynamic interaction takes place between personal, behavioural and environmental factors. As Morris et al. (2017) conclude about core idea of social cognitive theory: "... the effect of an experience on one's sense of efficacy depends on how a particular event is cognitively processed" (p. 798). According to the model of the development of teaching self-efficacy proposed by Morris et al. (2017), sources influence a teacher's thinking and beliefs and, in turn, they build teacher self-efficacy. "This model identifies factors involved in the integration and evaluation of this information that may mediate or moderate the relationship between the sources and self-efficacy" (p. 819).

The *research methodology* concerning the sources of teacher self-efficacy also requires attention. Research into the sources has tended mainly to be quantitative. Quantitative studies show quite stable correlations between the sources and teacher efficacy beliefs, albeit of varied intensities. As the mechanism of source activity – i.e. how they relate to each other and to teacher self-efficacy – is far from clear, we have an important reason to conduct qualitative studies in order to understand the self-efficacy sources and how they interactively construct teacher self-efficacy. Some researchers conclude that more qualitative and interpretative investigations are called for in order to understand the meaning teachers attach to those sources of teacher self-efficacy (e.g., Wheatley 2005). In sum, there exists a particular need for qualitative research methodology and a mixed methods approach in this research area (see Wyatt, 2014). Henson (2001) argues that efficacy beliefs may be more easily influenced during the formative years of preservice teacher education. In summary, there is a

need to conduct a qualitative study on the sources of student teacher self-efficacy, as they certainly play an important role in teacher development, especially in the beginning phase.

Previous research conducted mainly on teacher self-efficacy in pre-service teacher education and its implications

From a research methodology perspective, studies look in different ways to determine what “sources” really means. In quantitative research, sources according to Bandura's theory have been operationalised, giving a variety of claims to the research instrument, but there are also qualitative studies in which the corresponding sources are explored in more detail, i.e. *sub-themes* are discussed, when the actual sources are *themes* (Wang et al., 2017). It seems that some qualitative studies specify in more detail what is meant, for example, by mastery experiences, and what feedback means and when it supports teacher self-efficacy. Such research findings help us to better understand how different types of sources build teacher self-efficacy. In other words, there is an interest in what kind of content and situational issues are encountered by the respondents, i.e. the student teachers, and what role they play in the formation of their self-efficacy beliefs. Naturally, qualitative research about the sources of efficacy beliefs has been somewhat more nuanced than quantitative in similar areas. In the case of correlative and many qualitative studies, it is often quite difficult to say whether those factors are the *causal sources* of self-efficacy (although in fact social cognitive theory holds sources in a causal role). Therefore, studies which examine the source-teacher efficacy relationship in the longitudinal setting on the one hand, and qualitative studies which aim to construct a broader frame of reference between “source” and “self-efficacy”, on the other, have also begun to appear. In other words, those relations are connected *to other factors and characteristics in teaching and teacher contexts, etc.*, and only when a broader and process-taking macro-structure is outlined can we, as researchers, better detect and understand the so-called causal mechanism.

Empirical studies – such as the following – often highlight the finding that teacher mastery experiences are at least one of the most important self-efficacy sources. A quantitative study by O’Neill and Stephenson (2012) provides information about the self-efficacy of final-year Australian preservice primary teachers and the sources of information that contribute to it. The sources with the highest mean score for effect were mastery experiences and verbal persuasion. The feedback received by student teachers from their cooperating teachers in particular seemed to be highly essential. In a study by Bursal (2012), the findings are also consistent with social cognitive theory, because science inquiry activities and micro-teaching activities were reported by the student teacher to be the most valuable experiences for increasing their self-efficacy beliefs and lowering their anxieties toward science. Yüksel (2014) conducted a longitudinal study which aimed to trace changes in the self-efficacy of Turkish preservice teachers over a year and to detect the sources of information that influence their self-efficacy. The findings show that the self-efficacy of preservice English language teachers changed significantly over time. The teachers seem to be more influenced by mastery experiences and social persuasion than vicarious experiences and affective matters as sources of self-efficacy. Uzuntiryaki’s study (2008) examines the sources of the development of self-efficacy in Turkish preservice chemistry teachers. In this qualitative investigation, mastery experiences were the main source of self-efficacy beliefs. Physiological arousal and vicarious experience were also influential sources of self-efficacy.

Yada et al. (2019) investigated teacher self-efficacy and the sources thereof in Japan and Finland in the context of inclusive practices (in working life). In both countries, mastery experience was identified as the most powerful of the four sources contributing to teacher self-efficacy. The second source that made a unique contribution to efficacy beliefs in both countries was vicarious experience, but it impairs the level of self-efficacy in Japan. In the present context, the finding may indicate that a teacher has the challenge of finding a role model in his or her own school with essentially the same ability and personal attributes. There is also the possibility of the lesser impact of vicarious experience on teacher self-efficacy at this developmental phase, as working teachers have already established their own professional identity. In other words, making observations in the context of teacher education can be a much more essential source for the development of teacher self-efficacy. Morris et al. (2017) express the same idea in their research review, i.e. that teachers have insufficient opportunities to observe their colleagues, and this limits the influence of vicarious experiences on teacher self-efficacy. It seems that the affective state is not a predictor of teachers' self-efficacy beliefs in itself, but rather mediates self-efficacy beliefs through cognitive processes. The findings of Yada et al. (2019) are similar to the investigation by Poulou (2007).

Research on sources often reveals that feedback (verbal and social persuasion) and observation of another teacher (supervisor, mentor or student teacher) are also relevant. Emotional, physiological, and affective states have been reported in somewhat fewer empirical studies. The findings suggest that some sources are more strongly associated with teacher self-efficacy than others in an individual study. Because the findings are variable and the studies have been conducted in different contexts and with different methodologies, they will not be given more attention here. In general, research findings indicate that mastery experiences, or mastery experiences with social persuasion, or mastery experiences with vicarious experiences, are particularly important sources, or that up to all four "theoretical" sources are significant for the development of teacher self-efficacy beliefs (see, e.g., Akkuzu, 2014; Bursal, 2012; Clark & Newberry, 2019; Hastings, 2012; Hoi, Zhou, & Teo, 2017; Mansfield & Woods-McConney, 2012; Oh, 2011; Palmer, 2011; Wang, Tan, Li, Tan, & Lim, 2017).

A few investigations highlight the importance of content knowledge or pedagogical content knowledge as a builder of self-efficacy, or at least the fact that, combined with teaching self-efficacy, it gives the teacher a free hand to design pedagogically meaningful and diverse teaching solutions (see, e.g., Glackin & Hohenstein, 2018). Menon and Sadler (2016) investigated changes in student teachers' science self-efficacy and science content knowledge and their mutual connections in a specialised science content course. The findings show the development of teachers' self-efficacy beliefs and the development of their conceptual understanding are interrelated. In another study, Palmer, Dixon, and Archer (2015) reported findings that an increased understanding of science concepts was an important factor for increasing self-efficacy. In a previous study, Palmer (2006) suggests that cognitive content mastery also contributes significantly to participants' science teaching self-efficacy beliefs. Again, in a study by Leonard, Barnes-Johnson, Dantley, and Kimber (2011), teachers with high level efficacy beliefs are said to have a better understanding of their students' prior knowledge and background than other teachers. Certain studies have found – usually alongside the sources of Bandura's theory – other source factors such as attitudes towards the use of educational research (e.g. İlhan, Yılmaz, & Dede, 2015; Hascher & Hagenauer, 2016), teacher personality and other individual properties (e.g. O'Neill & Stephenson, 2012; Poulou, 2007).

In summary

As mentioned above, most research on self-efficacy have largely been quantitative, but some qualitative studies have been conducted. Menon and Sadler's (2016) study includes qualitative analysis and is placed in the context of preservice teacher education, but it focuses on the relationship between science content knowledge and self-efficacy. Wyatt's (2016) qualitative investigation is placed in the context of in-service teacher education and focuses on the importance of practical knowledge (which in itself is an important factor in building self-efficacy). Glackin and Hohenstein's (2016) qualitative study of science teachers has not been conducted in a preservice teacher education setting, but as a triangulation study it provides an example that such variety of research data also offers versatile conceptions of self-efficacy, and these researchers aim – including lesson observation – to achieve a more complete and comprehensive picture of teacher self-efficacy. In terms of research methodology (qualitative) and coverage of the sources of Bandura's theory, perhaps the closest parallel is the study by Wang et al. (2017), but it is a study of working life teachers and a rather special teaching context (teaching low-achieving students). Other empirical research in the field from the 2010s is almost invariably based on quantitative research methodology or has been carried out in the teaching context of one subject (and quite often in different science teaching) – either in the context of teacher education or working life. Less research has been carried out into how different source factors together build self-efficacy beliefs. In particular, Clark and Newberry (2019) talk about how diverse experiences collectively affect student teacher self-efficacy. There is also room for improvement in qualitative research: it would be important to build a scientific understanding and analysis as to whether certain sources are linked in a mutually beneficial way and whether certain sources with certain contents are valued more than others.

Examining what is perceived as negative and what is perceived as positive is a different matter to examining what, according to the participant, ultimately contributes to teacher self-efficacy. We want to approach this perspective holistically and listen to the explanations of the student teachers as to why certain source factors are (ultimately) valuable and what, on the other hand – seemingly “positive” or “negative” – are not. As researchers, however, we also aim to build broader structures by analysing the data; in other words, we aim to identify how different sources interact and with which other factors the sources intertwine. We identify the characteristics of the sources in such a way that we do not emphasise personality-based analysis by dividing teachers into high self-efficacy and low self-efficacy, but by analysing the characteristics that are common to multiple teachers. To conclude this section, we would like to present the research questions of the study:

1. What kind of content descriptions do student teachers attach as a source of self-efficacy for the following?
 - (a) Mastery experiences
 - (b) Vicarious experiences
 - (c) Social persuasion
 - (d) Emotional element
2. What are the factors and situations – mainly within the given source categories – that increase or decrease teacher self-efficacy? And how might they link together?

Method

Participants

The research data consisted of transcribed interviews of 25 student teachers (16 female, 9 male) who aim to complete a master's degree and qualify as a classroom teacher at the University of Eastern Finland¹. Most of the students included in the study were in the second half of their studies, i.e. in their 3rd or 4th year². They had spent a considerable amount of time in teacher education, and taken courses about research methods, thesis studies, studies in subjects to be taught and various courses of teaching practice. In addition, some students had teaching experience before and during their teacher education. Table 1 contains information on the teaching experience, the stage of study at university and the gender of the interviewees.

Pseudonym	Gender	Amount of teaching experience	Year of study
Eero	Male	1-2 months, one year as an assistant	4
Veikko	Male	1 month, short replacements	4
Ulpu	Female	1 year	2
Pipsa	Female	4 years of early childhood education as a teacher, with a few substitute teachers as an assistant	5
Lisa	Female	No teacher work experience	3
Maisa	Female	Some deputies, one and a half years as an assistant	3
Silva	Female	2 years as an assistant	3
Maria	Female	A couple of times	3
Maiju	Female	More than 1 year	2
Pinja	Female	Less than 6 months	3
Pertti	Male	Short replacements over 1 month	4
Tino	Male	Short replacements for 1 month, assistant for 6 months	4
Lea	Female	3 months	4
Vesa	Male	3 months and additional short replacements	5
Piritta	Female	Random substitutions	3
Joel	Male	3 years	4
Sara	Female	6 months	5
Teppo	Male	Less than 1 month	4
Jaakko	Male	1 and a half years	5
Inka	Female	3-6 months	4
Krista	Female	A few short substitutions	7
Minja	Female	No teacher work experience	4
Metti	Female	No teacher work experience	4
Teija	Female	No teacher work experience	3
Veini	Male	More than 3 months	4

Table 1. Student teachers' background information (N = 25)

¹ The study uses pseudonyms, both in the interviews and in the research findings.

² The student's year of study is his or her actual year as a student (at the time of data collection). The curriculum in teacher education has been prepared for 5 years.

Data collection

In the study, data collection was carried out in connection with the *Qualitative Research 2* course. Some of the students who participated in the course were respondents, and others assisted with the data collection and transcription. The interview request focused on a total of 26 students, 25 of whom agreed to be interviewed. A written notice was prepared, which was also discussed orally and the participants had the opportunity to ask questions. Participants were entitled to withdraw from the study. Research permits were obtained from the head of the department and from each participant with a signature, i.e. the student teachers filled out consent forms. At the same time, they were assured that the data resulting from this study and participant identity would be treated with absolute confidentiality.

Construction of a research instrument and implementation of the interview

The research instrument, i.e. the list of interview questions, was compiled theoretically such that it was divided into 4 sub-areas, i.e. the sources, according to Bandura's (1997) social cognitive theory.³ This means, from the construction of each source, questions were formulated about the factors/situations that, according to the respondents, elevate his or her own sense of self-efficacy belief and about the factors/situations that can lower it. The many themes and items used to prepare the questions had already been used in some form in both quantitative and qualitative investigations (see, e.g., Wang et al., 2017). In total, the instrument contained 25 questions. For each source of self-efficacy area, 4-8 questions were constructed including a few potential refinement questions (i.e. situations that bring about an increase in self-efficacy and, on the other hand, situations that lead to a decrease in self-efficacy). One question was developed to assess the teachers' self-efficacy per se. The interview also included 2 background questions. The interviews were recorded and transcribed, producing several pages of text per respondent.

Data analysis

The data were analysed using the thematic analysis model as described by Brown and Clarke (2006). The article on the application of the analysis model on which it is based was further utilised (see Maguire & Delahunt, 2017). The analytical model is well suited for a wide range of qualitative research. Furthermore, it can be used both for data-driven analysis and theory-based analysis. The analysis model includes six phases, but the work is not carried out linearly in practice. Following Brown and Clarke the thematic analysis was conducted over six phases: reviewing the data, generating preliminary codes, identifying themes, discussing the themes, defining themes and presenting the results.

Findings

The results of the study are presented in the order of the source categories of self-efficacy: Mastery experiences, feedback, vicarious experiences and affective experiences. Outside the theory-based instrumentation, a new category of 'teacher knowledge' emerged, which is finally examined.

³ The participants studied were given information on the source categories of Bandura's theory (of self-efficacy), i.e. what they mean. This has reduced misunderstanding and thus increased validity.

1. Mastery experiences

The respondents disaggregated mastery experiences into positive, i.e. self-supporting, experiences and negative experiences, which in their own opinion reduced their level of self-efficacy. It is important to note, however, that some of the negative experiences, according to the respondents' own interpretations, did not decrease their self-efficacy but were sometimes interpreted to mean an increase in their sense of efficacy. The data were analysed in such a way as to also identify the substantive issues and situations to which the mastery experience related. The following is a list of these so-called sub-themes⁴: a) success in achieving goals (+); b) planning (+) (-); c) student learning (+) (-); d) success in challenging situations (+) (-); e) classroom atmosphere (+) (-); f) knowledge about students (+) (-); g) encouragement makes students learn (+); h) teacher's favourite theme to teach (+) (-); i) experience of the effectiveness of one's own activities (+); j) success, although implementation deviates from plan (+); k) experiencing failure as empowering and motivational (+); and l) differences in student levels (-).

The respondents were thus often able to specify the situation on the basis of which the mastery experience arose. The main reasons were related to planning and achieving goals. Reference is often made to student learning, i.e. *Pinja* and *Joel* consider that planning is the key to successful and learning-promoting teaching.

Pinja. Someone has learnt something that is said to be difficult or that they will never learn, and yet they have learnt it.

Joel. You find out that you have planned the lesson and implemented it how you imagined it, then the student learns and embraces things through it – for me, this is the biggest thing that affects my own performance.

Student teachers reported that their own perceptions of a student's learning success produced a sense of efficacy – this was generally felt to mean the same as achieving a goal. Good planning was mentioned among the individual means that often produce a mastery experience. On the other hand, "poor" planning was often seen to cause problems and to result in students not actually learning properly. Successfully dealing with challenging situations (e.g. a student who initially has problems learning) also results in an increase in the student teachers' self-efficacy, according to the respondents.

However, there are many experiences where an initially negative experience of failure – which is obviously short-lived emotionally or has no negative emotion at all – is interpreted as having helped to develop thinking about one's own teaching: failure is seen as empowering and motivating for future situations (*Ulpu*). The following quotation exemplify a such situation.

Ulpu. Experiences of failures are disheartening at the time, but when considered in retrospect, they become empowering. Because you get to think about what you could have done differently. In this process, the experience becomes empowering.

⁴ The sub-theme is followed by a (+) if it has been perceived to elevate the teacher's sense of efficacy. If, on the other hand, a (-) sign is presented, the issue or situation related to the sub-theme decreases the teacher's self-efficacy. For example, planning has been perceived as positive (+), but, for example, a lack of or too little planning has been perceived to reduce a teacher's sense of personal self-efficacy (-).

Other means or contexts that aid teaching are getting to know the students, having a topic that the teacher likes to teach, and having a good atmosphere in the classroom. Differences in the students' levels of learning skills were seen to hamper the success of teaching. Mastery experiences are usually linked to one other source factor of self-efficacy: physiological and emotional states. Thus, in a successful situation, the above-mentioned sub-themes are often accompanied by a positive emotion, i.e. teaching produces joy, satisfaction and other positive emotions for the teacher. Failed or negative mastery experiences, on the other hand, were associated with depression.

2. Feedback

Different people make comments and give feedback to student teachers. These sources can also be divided into positive and negative feedback, but the most important factor that groups – or rather, adds value to – the sources is who exactly is providing the feedback. The different people involved can be divided in order of importance as follows: supervising teacher; student; and student teacher. This means that the feedback provided by the supervising teacher was considered central to the other feedback. For some participants, feedback from the student was also perceived as equally important. Peer feedback, i.e. feedback from another student teacher, was considered least important. When all feedback is grouped into sub-themes, the following list emerges: a) the supervising teacher is seen to have a significant role or authority (+) (-); b) critical feedback from the supervising teacher is perceived as positive because it is constructive (+); c) feedback from students (+) (-); d) feedback from student teachers (+) (-); e) lack of feedback (-); and f) weakness of teacher supervision (-).

The supervising teacher is considered to play a significant role when it comes to giving feedback. He or she is considered an expert and an experienced teacher whose judgment can be relied upon. Even critical feedback, if given by the supervising teacher, is perceived to be constructive and thus elevates self-efficacy. Of course, some student teachers consider that too little feedback is given, or that feedback is of poor quality. However, most emphasise the key role of the supervising teacher as a provider of verbal and social persuasion (Silva and Vesa).

Silva. Yes, I think the supervising teacher is important. He is a professional. I don't want to belittle peer feedback, but for me, it's just more important to have feedback from the supervising teacher.

Vesa. When I had physical education (PE) with a more experienced teacher, I got really good feedback when I was able to bring new things to the teaching, I myself already having had experience teaching PE. He was excited and said he wanted to record my ideas on video. It was a nice experience to get an experienced teacher to share my own ideas.

Feedback from students is also valued and is thought to affect the sense of efficacy by raising or lowering it. Feedback from students can be verbal, but according to student teachers, "feedback" is very often perceived as an observation-based interpretation, i.e. the subject draws conclusions through students about how teaching has been experienced and how its implementer, i.e. the teacher, has been experienced. Teacher self-efficacy subsequently increases or decreases after observation (Pertti and Lea). Very often, "feedback" from students is also interpreted emotionally (Pertti).

- Pertti:* If the feedback from the student is positive, it would seem that the students like... that the lesson is to their liking – of course this is encouraging. The positive attitude of the students has an emotional significance for the construction of the teacher's self-efficacy.
- Lea:* Well, feedback from students is always nice to hear, or when you know that the students have enjoyed the lessons or have found the learning atmosphere safe, it has affected their sense of ability.

The student teachers who were interviewed do not value peer feedback. Whilst it is not considered completely unnecessary, it is not relied upon in the same way as feedback from the supervising teacher or student, or observations from the student. Its credibility also suffers because it is often only positive or neutral, and not very specific. Thus, it is not considered to increase or decrease teacher self-efficacy.

3. Vicarious experiences

Vicarious experiences have a logical connection with feedback: the supervising teacher is not only the central “influencer” and feedback provider, but also an important and essential object of observation. The observation directed at the supervising teacher manifests itself in such a way that the respondents feel that they have received good models, ideas and practices from the supervising teacher (as Maria and Metti say, see below). Observations by student teachers focus on specific issues such as teaching methods, classroom management, and student enthusiasm.

- Maria:* During the teaching practice period, I admired the calmness and assertiveness of the supervising teacher as well as his warmth. I admired his overall personality as a teacher.
- Metti:* When one has observed a way of working in a difficult situation and agrees with it, then one thinks that one can do the same and succeed in one's own practice.

In addition, a few student teachers are characterised by the possibility of forming a so-called “ideal teacher” model through observations of different teachers. This is not mere imitation, but involves in-depth cognitive processing and perception of the whole. In summary, vicarious experiences could be classified into the following sub-themes: a) observation of the supervising teacher (+); b) observations of students' enthusiasm (+) (-); c) observations of teaching methods and classroom management (+) (-); d) combining traits from different teachers into their own ideal model (+); e) observation of failure resulting in wanting to do things differently (+); f) negative media coverage of the teacher (+) (-); g) own school memories (-); and h) doubt of one's own abilities (-).

In the light of the data, the media is seen as a source of self-efficacy in a critical or inverse way; in other words, negative news about teachers does not weaken the teacher's own thinking and beliefs about his or her own professionalism (Joel and Sara, see below). Instead, it generates a certain kind of counterforce and fighting spirit to pursue one's own profession with ambition.

- Joel:* Of course I think, for example, about negative news about the teaching profession. However, it does not directly affect my self-efficacy.
- Sara:* The headlines in the news about teacher career changes make me think about how I'm going to last as a teacher myself, but I'm not worried about the future.

Another significant “negative observation object” concerns the implementation of a teaching practice by another teacher, most often another student teacher in these data, which can sometimes be considered a failure. For example, Pertti followed another student teacher’s lesson during the teaching practice period and noticed that the lesson was not quite successful.

Pertti. I thought I would not work that way, at least. Teaching practice lessons are a bit of a cautionary examples sometimes – of course we learn from them.

This results in cognitive processing and reflection that creates for the respondent a “reverse” model of future potential situations as a teacher. In other words, the student teacher wishes to act differently and to understand the mechanisms behind the failure and the results. The thinking here ultimately focuses on what could be behind a hypothetically successful operating model, i.e. why a different process could then work better. However, the comments made by student teachers at this point were not harmful or offensive to another teacher, but were quite often accompanied by reflection on the mechanisms and context as well.

4. Affective experiences

The data show affective states to be either generally associated with an emotion or affect that is said to increase or decrease a teacher's self-efficacy, or the emotion or affect to be linked to a specific action. General emotional experiences can be negative emotions; these were usually felt to lower a teacher’s self-efficacy feelings, i.e. causing a certain kind of helplessness and anxiety, for example. Participants also talked about the positive general condition such as enjoyment that teaching brings them (Lea, see below).

Lea. When you get to teach and feel that you are in the right place, when it feels like your own field, then you get a feeling of well-being, you enjoy it.

Lea. When the job is done well and progresses well – you get into the flow of teaching and spend longer amounts of time with the same students, for example – then you come across as relaxed and you are more of the kind of teacher you have dreamed of yourself.

However, emotional reactions and affections have many links to another important source factor: the mastery experience. Based on the analysed data, they form a very organic and functional coalition, which is therefore not purely cognitive and rational in nature. Mastery experiences very often involve emotional states that further reinforce or, conversely, decrease (along with rational reasoning) teacher self-efficacy. For example, poor planning was often linked to stress and anxiety, which at the same time produced a negative mastery experience. In other words, mastery experiences, a lack thereof, or inverse mastery experiences (i.e. negative experiences) are quite often associated with emotional states (Joel).

Joel. What I’m feeling isn’t fear, it’s stress; if you’re not prepared for a lesson but have to improvise, then you might be distressed.

Correspondingly, one of the most important sub-themes of the mastery experience, i.e. student learning, was usually quite strongly linked to an emotionally positive state. Overall, emotions were associated with the following sub-themes: a) positive state of being (+); b) sense of success when organising and planning (+) (-); c) lesson fun brings a sense of success (+);

d) students' motivation or lack of motivation (+) (-); (e) anxiety and tension (-); (f) stress (-); and (g) powerlessness due to learning difficulties or student background factors (-).

5. Teacher knowledge

The theory-based research instrument, the interview instrument, specifically included questions that referred to all sources of self-efficacy. However, attention was drawn to the fact that some of the interviews with the respondents particularly highlighted the importance of knowledge. Student teachers consider the dimension of knowledge to be important for increasing self-efficacy. This is quite natural, given that the context of this study is teacher education. Teacher self-efficacy and skills as a teacher were perceived as problematic if there were clear knowledge gaps. The respondents reflected both of these potential prospects. This type of source can be divided into three sub-themes: a) content knowledge development (+) (-); b) knowledge about students (+) (-); and c) knowledge about group management (+) (-). Knowledge seems to link quite often with the growth of the mastery experience or the problematic nature thereof (Lea).

Lea. When you master content, the experience of your own ability to teach is more positive.

Lea. The ability to teach depends, I think, on content knowledge – if the topic feels challenging, then teaching it also feels more challenging.

As such, content knowledge is strongly linked to gaining mastery experiences or the problematic nature of the lack of knowledge in teaching. Based on the data, it also seems that a lack of knowledge and skills related to group management reduces the possibility of mastery experiences. A teacher's knowledge that focuses on his or her students increases the likelihood of successful experiences, whilst on the other hand, shortcomings in knowledge easily lead to negative experiences).

Discussion

According to the data, teachers' mastery experiences are often combined with supportive emotional reactions. Positive experiences, while having a clear, rational and substantive, and sometimes detailed, focus, are often combined with positive emotion. Teachers talk about a sense of control, and at the same time they feel relaxed. They feel pleasure when students genuinely take part in classroom process. On the other hand, the findings show that poor planning experience is associated with depression and stress. The content of a mastery experience can be very broad or general, but sometimes it focuses on a narrower area. All the same, mastery experiences are about the student teacher's own observations, experiences and reflections, and these are quite often also empirically connected with emotional reactions, even when the research instrument is essentially focused on identifying only mastery experiences or only emotions. This suggests that it is precisely one's own experiences that are treated cognitively and that "learning" occurs through them, but also emotionally. Emotions can be such that they either support an increase in self-efficacy or such that they decrease one's sense of efficacy beliefs. Knowledge, too, is often such that it is linked to mastery experiences and emotions.

The teacher's own experiences, together with the emotions associated with these, in a way form the so-called "internal world". But that is not the only comprehensive source of inspiration for the teacher: it is possible to speak of the so-called "external world", which

here means receiving feedback from the other people involved in the field of education as well as making observations about other teachers. It is also a question of the extent to which the student teacher trusts the external source of inspiration that is available to him or her. In this sense, both receiving feedback and making observations are linked; i.e. they are valued in the context of teacher education according to very similar criteria: it seems that the role of the *supervising teacher is central here*. Based on the data from this study, the supervising teacher inspires confidence and is listened to. The same is true for observation. Previous research suggests that mentors and teacher educators certainly play a positive role in the self-efficacy of student teachers in teacher education (Rots, Aelterman, Vlerick, & Vermeulen, 2007). Molding, Stewart, and Dunmeyer (2014) examined the verbal persuasion given by a mentoring cooperating teacher and found a significant correlation with preservice teacher self-efficacy. The data from this study shows the school student to also be perceived as important, i.e. if the student provides verbal feedback to the student teacher, it is quoted and considered valuable. It was often mentioned that observations are made about the student and that this “indirectly” plays a major role in the reflection of how the teacher feels successful, which then increases or decreases the student teacher’s sense of efficacy.

The peer role of the student teacher is at the lowest level of the feedback and observation hierarchy, although few people would deny the importance of positive feedback; for example, it is perceived as pleasant and supportive to receive feedback from another student teacher. Observations about the student teacher are made in two ways: (a) the aim is to build a holistic palette of the ideal teacher, i.e. different teachers influence the student teacher, who then tries to build a “suitable” perception of the ideal teacher. Observations are sometimes, however, also targeted at (b) the “failure” of the student teacher or an activity that is processed “inversely” in such a way that the student teacher himself or herself wishes to do the opposite. However, this reverse activity requires the student teacher to have a varied and in-depth critical reflection as to why a situation or teaching period was not successful or why it would have required a different approach. Quantitatively, such findings may not constitute a significant source for the student teacher during teacher education; based on the interview data, however, they do appear to also shape the self-efficacy of teaching. They are not so much attached to the personality or essence of the observable student teacher in general. It is precisely as a provider of verbal feedback that the student teacher is not, however, cited as important; it is felt that feedback that focuses precisely on the student teacher’s own development in a relevant and critical way is not genuine or truthful. However, this “constructive” feedback is desired, as is evident in several responses from the student teachers.

Overall, it seems that negative experiences or perceptions of another person’s teaching or even feedback are not processed in a way that would automatically lower a teacher’s self-efficacy. What is crucial is what kind of thought process one’s own observation, received feedback or experience sets in motion. The same applies to knowledge, or rather a lack of knowledge. For example, a student teacher may have his or her own idea and experience that he or she lacks knowledge of a subject, admits it to himself or herself, and understands that his or her own teaching will be cumbersome before it is corrected. In the data of this study, as a source factor outside the theory of Bandura (1997), teacher knowledge was also considered to be related to the construction of teacher self-efficacy. This finding also emerged in the qualitative study of Wang et al. (2017) and in the quantitative study of Poulou (2007). According to Wheatley (2002), experiences of low self-efficacy are not always

negative, but instead they may mark or be the beginning of development. Teachers experience and need doubt, as it signifies the beginning of reflection and learning (see also, Wyatt 2014). Wyatt (2014) summarises the core idea as follows: “Self-doubt and reflection help the teacher overcome low self-efficacy beliefs” (p. 176). We should therefore also better understand the role of knowledge in teacher self-efficacy formation (see, Klassen et al., 2011; Morris et al., 2017; Wyatt, 2014).

There are also shortcomings in the methodology of our research. The interview questions guide the informants to choose memories that are related to self-efficacy, but the most questions do not focus on certain “real” teaching situations which happened recently. This is cognitively challenging for the informant. It is also possible for the student teacher to confuse the dimension of a positive or negative experience with one that focuses on factors that increase and decrease self-efficacy. Participants are not always able to analyse what actually builds their personal teaching efficacy. In addition, a few student teachers only have practical teaching experience from their teacher education (or very little experience of working life as a teacher), so there is little experience in terms of quantity and specifically “genuine” experiences. This also explains why some of the interview questions were answered only briefly.

How should research proceed from now on? The content of teacher education is relevant to this. Clark and Newberry (2019) state, that less has been studied on “how these multiple experiences collectively influence preservice teacher self-efficacy” (p. 33). It is a question of what teacher education can offer on the whole and, on the other hand, how active and boldly “experimental” the student teacher is. One can therefore critically ask whether “influences” really are good. Of course, it is true that “Qualitative studies could provide insight into which of the teaching opportunities were experienced as mastery experiences and which were not” (Clark & Newberry, 2019, p. 41). Researchers also conclude, however, that it may also be true that teacher education does not offer enough of what is “new” in terms of trainees’ pre-existing background knowledge. One challenge, therefore, is *to make the sources stronger in teacher education*. Participating in teaching practice always produces some experiences of teaching. But teacher education could more often a) encourage students to have a wider variation in how teaching works. On the other hand, certain types of teaching conditions should be pursued in teaching practice b) also intentionally, using theories or the results of previous research. This ideal is more demanding than just urging careful teaching planning - which is a fairly conventional instruction in teaching practice.

Consideration should also be given to whether teacher candidates could also experience failures followed by successes. In other words, how do they deal with stressful situations and not so successful situations, and continue to persevere? Researchers also consider feedback, i.e. whether student teachers receive it, whether it is positive and critical, whether it is specific and detailed or only superficial. Examples of this issue are also provided by the data in this study: some felt that feedback had not always been sufficiently critical, expert or “genuine”. “Apprenticeship of observation” can also be seen in a negative light; it does not necessarily lead to or stimulate “real” learning from teaching.

In conclusion, there are already some preliminary ideas for the development of both teacher education and research methodology. In future research, we should focus on ensuring sources are real and relevant and, above all, identify – and build on – sources more broadly and in an innovative way, so as to create new and rich teaching situations. The research focus should also be approached from different perspectives. In this sense, the

interview and questionnaire are only one side of the method. For example, Glackin and Hohenstein (2018) carried out a primarily qualitative investigation of a small number of science teachers. The findings suggest that a qualitative research methodology provides a nuanced and valid picture of how a teacher's self-efficacy manifests in his or her work. They wanted to use lesson observation as complementary data, i.e. the researchers sought to take advantage of triangulation. This gives us a broader, comprehensive picture of the phenomenon. Glackin and Hohenstein (2018) state: "Whilst on one hand this finding, that multiple states of teacher self-efficacy act to influence pedagogical choice, highlights just one of the challenges of understanding teacher self-efficacy, on the other hand it illuminates the importance of a descriptive complimentary analytical framework so that specific judgements might be better understood" (p. 286). In research settings, we should aim for studies that seek a macro-examination of the phenomenon. Preliminary indications of certain factors and properties being linked have been obtained in this study. Such work should be continued through the holistic integration of research data and different perspectives. In this way, the so-called causal mechanism could also be better identified and understood, i.e. it is a question of which combined factors produce the teacher's self-efficacy.

To an increasing extent, researchers also want to focus their research on the examination of teaching situations, i.e. how certain specific situations or periods included in teaching feed or reduce a teacher's self-efficacy. Some researchers prefer the methodological perspective mentioned above, *situation specific* to a broad time period (see, Neugebauer, Hopkins, & Spillane, 2019), as this provides a stronger link between source and self-efficacy. Likewise, the conditions and circumstances of the self-efficacy environment should be elucidated using different data collection methods. We intend to continue our research next by developing a methodology in the direction of the teaching situations. In other words, we want to analyse in more detail how the student teacher experiences and the sources of self-efficacy relate to specific situations and contexts in the teaching process. For example, videotaped teaching and commenting on sources of self-efficacy will thus validate the analysis of the source-teacher self-efficacy -relationship. Further research may concern the research methodological problem of how to access self-efficacy, or whether it can be accessed at all. The use of quantitative and qualitative methodologies in some studies has provided conflicting, or at least different, perspectives on what teacher self-efficacy is. The research methodology of the field distinguishes between *articulated self-efficacy* and *embodied self-efficacy*. The conceptual understanding of self-efficacy and the related empirical research methodological issues are also related to *how we acquire the factors that build teacher self-efficacy*.

Notes on contributors

Harri Pitkäniemi, PhD, docent, works as an university lecturer at the School of Applied Educational Science and Teacher Education, at the University of Eastern Finland, Joensuu. His work encompasses a wide variety of perspectives on school learning such as teacher cognition and beliefs, student cognition, and classroom interaction. He also favours comprehensive and integrative methodologies such as mixed methods and research designs which connect a variety of perspectives within a single study.

Timo Martikainen, PhD, works as a lecturer at the Teacher Training School of the University of Eastern Finland, Joensuu. He is experienced teacher educator, mentor and counsellor of

teaching practice. His interest areas are reflective action, intrapersonal and interpersonal interaction in education. He utilises case study, observation, interview and questionnaire data to develop educational practices and processes.

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