



# Fixed mindset as a challenge in teaching practice: A pre-service teacher's experiences of received feedback

Sonja Lutovac <sup>1\*</sup>

 0000-0002-3909-525X

Matti Hasari <sup>2</sup>

 0000-0003-2851-3759

Raimo Kaasila <sup>1</sup>

 0000-0003-3262-7185

<sup>1</sup> Faculty of Education and Psychology, University of Oulu, Oulu, FINLAND

<sup>2</sup> Teacher Training School, University of Oulu, Oulu, FINLAND

\* Corresponding author: [sonja.lutovac@oulu.fi](mailto:sonja.lutovac@oulu.fi)

**Citation:** Lutovac, S., Hasari, M., & Kaasila, R. (2023). Fixed mindset as a challenge in teaching practice: A pre-service teacher's experiences of received feedback. *European Journal of Science and Mathematics Education*, 11(1), 167-181. <https://doi.org/10.30935/scimath/12563>

## ARTICLE INFO

Received: 10 Dec 2021

Accepted: 9 Oct 2022

## ABSTRACT

Teaching practice is a critical component in teacher education, and better understanding of how pre-service teachers experience and interpret the feedback received in this setting is needed to understand teacher development in initial teacher education. Arguably, the mindset theory can help explain pre-service teachers' responses to and reception of feedback. This narrative study examines one pre-service mathematics and science teacher's experiences of received feedback from her supervisors during teaching practice and discusses the impact of her mindset on her reception of feedback. Esteri displayed a so-called fixed mindset regarding her qualities as a teacher and towards the feedback received, which greatly hindered her reception of the feedback. Interestingly, we observed characteristics of fixed mindset also in the feedback given by her supervisors. We discuss the challenges that fixed mindset poses for feedback practices, and what narrated experiences of feedback can teach us about supporting teacher development of future teachers in teaching practice.

**Keywords:** feedback, mindset, supervision, teacher education, teaching practice

## INTRODUCTION

Teaching practice is often the most critical and important component in teacher education, especially from the perspective of pre-service teachers' process of becoming a teacher, and their development (Gebhard, 2009; Tang, 2004). During teaching practice, pre-service teachers get opportunities to analyze their own teaching, and the setting has been found beneficial for inducing change in pre-service teachers' beliefs and practices (Walkington, 2005). Moreover, while teaching practice can provide significant learning experiences, it can be for pre-service teachers also a very emotional and challenging experience (Yuan & Lee, 2016). Supervisors' feedback has been acknowledged as particularly meaningful for how pre-service teachers' experience their teaching practice, what they learn from the experience and how it impacts the process of becoming a teacher (Buhagiar, 2013; Clark & Byrnes, 2012; Cohen et al., 2013; Hastings, 2008; Hastings & Squires, 2002; Hudson, 2014; Kastberg et al., 2019). The feedback has the power to shape pre-service teachers' beliefs and practices of teaching and learning, how they see themselves as teachers (Lutovac et al., 2015). Positive feedback often enhances self-confidence, alternatively, strong negative, non-constructive feedback can diminish it. In addition, the relationship established between a supervisor and a pre-service teacher matters too. For example, according to Yan and Lee (2016), a negatively loaded relationship with supervisors,

including for example mentor's control and constraint over pre-service teacher's practice teaching can hinder future teachers' development (see also, Izadinia, 2015, 2016).

Despite the great attention feedback practices have received, better understanding, on how pre-service teachers experience and interpret the feedback received is needed, especially since this will influence whether and how they will make use of it (Forsythe & Johnson, 2017; Winstone et al., 2017). In this paper, we contribute to this knowledge gap by exploring one pre-service mathematics and science teacher's–Esteri's–narrated experiences about the received feedback during her teaching practicum and interpret these experiences in the light of mindset theory by Dweck (2006), Bernecker and Job (2019), and Yeager and Dweck (2012). It is a theory of implicit beliefs individuals hold regarding human attributes and the ways these beliefs affect how individuals interpret information and react to it (Dweck et al., 1995). While the research on mindsets is extensive, the use of mindset theory in the context of feedback has thus far been limited (Forsythe & Johnson, 2017), and even more so in the context of teaching practice. However, we find the theory particularly useful when exploring feedback experiences in teaching practicum in the context of pre-service teacher education. It can help explain why pre-service teachers judge and react to the received feedback the ways they do, and it can help us understand, as noted in the literature, why feedback is often poorly received by university students (Winstone et al., 2017). Moreover, research exploring feedback experiences in teaching practice via mindset theory is limited, however, it would beneficially contribute to understanding teacher development in initial teacher education. Our study was guided by the following research questions: *How can pre-service mathematics and science teacher's narrated experiences of feedback received from her supervisors during teaching practice and displayed mindset in them help us understand how to support teacher development of future teachers?*

## THEORETICAL FRAMEWORK

### Mindset Theory

Implicit theories or mindsets can be understood as individuals' frameworks for thought and action (Dweck, 2006; see also Bernecker & Job, 2019). The extensive research demonstrated the existence of key implicit beliefs, such as those of intelligence, personality, and moral character to name a few, and two distinct mindsets that individuals operate under (Dweck et al., 1995; Hong et al., 1999). When an individual sees personal qualities, such as ability as unchangeable or fixed, we can speak of a fixed mindset. In this mindset, there is no space for improvement, instead it is all about innate ability, measuring and proving oneself (Dweck, 2006). Alternatively, we speak of growth mindset when an individual sees behaviors or processes as changeable. Individual's attributions to setbacks are also determined by their mindsets (Hong et al., 1999). Yeager and Dweck (2012) explain that the two different mindsets lead to two distinct worlds: one of 'threats and defenses' and the other of 'learning and growth' (p. 304). These mindsets, thus, have a great power to shape one's interpretations and reactions to experiences, whereas in the long run, the fixed mindset is more likely to enhance vulnerabilities and growth mindset, resilience (Blackwell et al., 2007; Yeager et al., 2011).

While the mindset theory has usually drawn attention to fixed vs. growth mindset as two extremes, it does highlight that mindset should be viewed as a continuum. Many researchers, however, misinterpreted and misapplied the idea viewing mindset as dichotomy (see for review, Murphy & Reeves, 2019). Murphy and Reeves (2019) claim that it is crucial to correct this false dichotomy to avoid mindset becoming a label for individuals. The two mindsets, growth and fixed can co-exist, which means that an individual can hold both mindsets depending on the attribute in question (see e.g., Bernecker & Job, 2019; Yeager & Dweck, 2012). For example, one can have a fixed mindset about their personality, and a growth mindset about their intelligence. Moreover, Anderson (2021) elaborated on the theory, identifying several mindsets on a continuum as fixed, low growth, mixed, growth to high growth. Therefore, one can work their way to the growth mindset gradually. Anderson (2021) argues for this development as to better understand the complexity of mindsets and the actions needed to change them.

Indeed, various interventions have demonstrated that mindsets are malleable and can be altered (Yeager & Dweck, 2012). Positive outcomes have been identified with interventions applied to low achievers (Blackwell et al., 2007; Paunesku et al., 2015; Yeager et al., 2019) and minority students (Aronson et al., 2002). However, some research demonstrates that interventions do not always provide a long-lasting change, and that

mindsets can change temporarily and may even revert to the initial state (Dommett et al., 2013; Orosz et al., 2017). For example, Orosz et al.'s (2017) study examined the impact of growth mindset training on high school students with good grades. The study showed that the intervention had for some students a short-term effect and their beliefs about their ability became more fixed by the end of the semester. The authors hypothesized that this negative influence on students' growth mindset might be related to the contextual issues, such as the pressures that come with the end of the semester (e.g., experiencing more failures) as well as the mismatch between the students' expected and received grades. It is important, therefore, to bear in mind that one's mindset is not stable and can change depending on the situation, context, and interaction with others as Murphy and Reeves (2019) pointed out. The authors talk about mindset triggers—the situations that call forward people's fixed or growth mindset, which are evaluative and high-effort situations, critical feedback, and success of others. In these situations, an individual can, therefore, revert to a fixed mindset.

The mindset theory is not without the critique though. Tewell (2020) critiqued the theory in terms of its inherent values of individualism and effort, and its underlying idea that success is accomplished by investing effort and that the responsibility for it lies in the sole individual. This then, as Tewell (2020) explains, suggests deficit thinking about the students. Tewell (2020) notes that the approach perpetuates "several major issues, including naturalizing ingrained forms of oppression, requiring the most marginalized learners to put in the most work, and encouraging people to adapt to broken systems instead of questioning them" (p. 138). Similarly, Wood and Haris III (2016) challenge the theory's limited focus on effort while insufficiently considering the challenges, such as racism and stereotype threat that may undermine one's effort. The authors believe that in education, the validation of ability is needed, especially for Black boys and men who often have not received messages that they have the ability to succeed.

### Teachers' Mindsets

Limited research explored the mindsets of teachers and the impact these mindsets have on their practices (Patrick & Joshi, 2019; Rissanen et al., 2019). However, it was shown that teachers' mindsets about intelligence especially, indeed influence teachers' practices, have the power to shape students' academic achievement and motivation, as well as bare impact on the ways teachers' act and interact with their students (Georgiou et al., 2002; Rissanen et al., 2018). Jones et al. (2012) demonstrated that pre- and in-service teachers define intelligence in variety of ways but have also identified a share of teachers who displayed fixed mindset. It has been shown that both, pre-service and in-service teachers who hold a fixed mindset regarding intelligence are less likely to feel responsible for students' underperformance (Patterson et al., 2016).

In their research on teachers' understanding of growth mindset and its implementation into their instructional practices, Patrick and Joshi (2019) demonstrated that teachers often falsely associate growth mindset with positivity, and thus may have a simplistic understanding of and/or misconceptions of the growth mindset. In a large sample of pre-service teachers, DeLuca et al. (2019) explored the linkages between their assessment mindsets and the classroom assessment. The study showed significant relationship between the mindset pre-service teachers had and the ways they saw the purpose and fairness of assessment. For example, pre-service teachers with a growth mindset prioritized the assessment as learning as well as a personalized and differentiated approach to assessment. Rissanen et al. (2019) developed a framework for a growth mindset pedagogy and have examined the framework in the context of one teacher's instructional practice. The study called for the need to acknowledge the theory of mindset in pre-service teacher education.

The studies by Jonsson et al. (2012) and Myers et al. (2003) attributed the differences in teachers' preferences for mindsets to their disciplines and have showed that mathematics teachers specifically, might more often display a fixed mindset. On the other hand, the study by Boyd and Ash (2018) showed that primary teachers displayed growth mindset regarding the intelligence in mathematics. Lutovac's (2019) study explored two pre-service mathematics teachers' narratives of failure, and observed that rather than the absence of failure, their stories displayed a growth mindset, and the two pre-service teachers simply rejected the idea of failure defining them, ultimately leading to their resilience. In all, the studies clearly show that fixed mindset, especially as it pertains to one's intelligence and ability to do mathematics, might be detrimental to students' learning and achievement, as well as to teachers' pedagogical practices and their interaction with students.

## Mindsets in the Context of Giving and Receiving Feedback

Compared to the vast body of literature on mindsets, little research has been done linking feedback and mindsets. With regards to giving feedback, Rattan et al. (2012) discussed the findings of their research in the light of the impact on teachers' pedagogical practices when dealing with students after they have failed. Similar to other research, their findings revealed that those who hold fixed mindset are more likely to judge students for their low ability in mathematics, but most importantly, their findings indicated that teachers with fixed mindset may be more likely to give comfort-oriented feedback (as opposed to strategy- or control-oriented), which ultimately communicated to student teachers' low expectations of them and resulted in students' low expectations of themselves. Jonsson and Beach (2012) reported on the findings of two studies on pre-service teachers' mindsets regarding intelligence and their relationship with the choice of feedback praise. Their findings suggested that pre-service teachers with a fixed mindset tend to prefer person praise. The authors also suggested that teacher education might have an impact in changing pre-service teachers' preference for the type of praise from person- to process-oriented praise. Similarly, the study by Rissanen et al. (2018) reported that teachers holding fixed mindset are more likely to praise students for their qualities. Regarding reception of the feedback, Forsythe and Johnson (2017) explored university students' perceptions of feedback and the relationship between feedback, mindsets, and defense mechanisms regarding feedback received. The study's findings demonstrated that a large number of students held fixed mindset and that students' self-beliefs, such as those about their intelligence and abilities played a key role in whether they engaged with the received feedback. The study by Mangels et al. (2006) also demonstrated that students who hold a fixed mindset are more likely to dismiss corrective feedback for learning and continue doing the same mistakes in subsequent evaluative situations. Taking race into account, Wood and Harris III (2016) demonstrated, however, that messages affirming students' ability, therefore a person praise, are needed as part of the practices for Black men in colleges as these are key predictors of their success.

## METHOD

### Data Collection

In this study, we examined one pre-service teacher's reflections upon two teaching practicums in mathematics and science teacher education context. Esteri (a pseudonym) was a research participant in the second author's dissertation (Hasari, 2019) that focused on examining 43 pre-service mathematics and science teachers' learning diaries from three teaching practicums and based on these the changes in pre-service teachers' professional identity, particularly in the domains such as reflection, beliefs, emotions, and self-esteem. In addition, Hasari (2019) explored whether and how the mentor teachers in teaching practicum had influenced these changes. For example, based on the survey, 48% of all pre-service teachers in his study fully agreed and 35% partially agreed with the claim "I got enough much support from the supervisors", and 45% of them fully agreed and 26% partially agreed with the claim "I saw the role of the feedback as a positive" (Hasari, 2019, p. 157). Pre-service teachers in Hasari's (2019) study were not given any specific guidelines on what to write about in their learning diaries, only to reflect upon their practicum experiences. The focus of this study, however, differs from Hasari's (2019) study as we chose to examine Esteri's narratives in the light of the mindset theory to understand her reception of the supervisors' feedback.

The data were collected during practice teaching in one teacher training school setting in Finland, where inquiry-orientation and pre-service teachers' reflective thinking are cultivated. The second author was at the time of data collection working in teacher training school as a physics and mathematics teacher, and at the same time conducting his doctoral research at the teacher education department. Hasari was not Esteri's supervising teacher in teaching practicum. This training school cooperates with one of the teacher education departments and is the second largest teacher training school in Finland. The school provides primary, secondary, and upper-secondary education. Teachers in this training school, like in others around Finland, tend to be highly qualified, often having had training and experience in guidance of pre-service teachers in teaching practicum. In Finland, pupils attend basic education in the schools in the area, where they live. This is the case also for this training school that gets pupils from nearby area and therefore of diverse backgrounds.

Practice teaching that Esteri attended was divided into two teaching practicums. The objective of the basic practicum was that pre-service teachers would acquire basic skills for planning, conducting, and assessing their own teaching. They would also acquire skills for working with diversity of pupils and for managing teaching and learning events. In the advanced practicum 1, pre-service teachers are expected to take a responsibility of their own work by practicing independent work with pupils, and planning, conducting, and assessing a wider share of teaching compared to what they have done in the basic practicum. During both teaching practicums, pre-service teachers are supervised by the supervising teachers in the training school. Usually, this is the teacher that otherwise teaches the classes and subjects, where the pre-service teachers' lessons are held.

The participant in this study is Esteri, female pre-service mathematics and science teacher who was at the time of the data collection in her third and fourth year of studies. Her major was physics, and minors, mathematics, and chemistry. Implicitly, through Esteri's narratives, the participants are also two supervising teachers, Evi—a female teacher and Kalle—a male teacher, both teaching in a teacher training school. All three participants are in terms of ethnic and social class identities typical of the Finnish context, which has relatively short time ago been quite homogenous. Among the six stories in Hasari's (2019) work, Esteri's narratives were similar as they portrayed coping with tensions, failure when dealing with negative emotions and insecurity about one's own professional identity. On the other hand, her narratives stood out, particularly with respect to the narrated experiences of the feedback received during the teaching practicums. With mindset theory in mind, Esteri was selected purposively for this study as we observed that on several occasions, Esteri's narratives reflected fixed mindset, and so did the feedback she received from her supervisor. Esteri's practicum experiences and the ways she responded to the received feedback from her supervisors were not typical and we chose Esteri as we see her as a critical and also intense case (Patton, 1990). Picking Esteri as a critical case for this study does not allow us to generalize our findings broadly, however, it does permit logical generalizations. As Patton (1990) suggests, critical cases allow us to think in terms of "if it happens there, it will happen anywhere" (p. 174). In terms of intensity, Esteri's case allows for an intense insight into the mindsets in teaching practicum, both Esteri's and her supervisors'. Esteri reflection upon her practice teaching was very open and detailed, including much of supervisors' reported speech, which allowed us to access indirectly also supervisors' feedback. Her narrative was also vivid and the circumstances in which the feedback arose, easily imaginable. Esteri's views of the two supervising teachers and the feedback received varied much and she was very critical about the feedback she received from the second supervising teacher, as well as of the teacher training system in general. While the learning diary Esteri produced during teaching practicums included reflections upon many various themes, for the purposes of this study, we selected for the further analysis only the reflections regarding the feedback she received about her teaching.

Teacher education program as well as practices in teacher training school follow the research-baseness, which also means that in the settings, research data are often collected. Pre-service teachers' learning diaries are a common source of data, however, pre-service teachers are always informed about the data collection beforehand and have the possibility to opt out from the participation in the study. Likewise, the pre-service teachers and supervising teachers in this study were informed and had given the consent for the use of the data they produced. Esteri allowed her learning diary to be used for this research purposes. In addition, we omitted some personal details from her data, in order to assure Esteri's privacy. We importantly note here that pre-service teachers, including Esteri, were aware that their participation in the study will have no influence on their competition of teaching practicums. Finally, while the study included human research participants, according to the Finnish National Board of Ethics in research, it did not require institutional review board approval.

## Data Analysis

In this study, we applied narrative approach to analysis (Lieblich et al., 1998). In the first phase of analysis, we created a data set for the purposes of this study. We have extracted from Esteri's learning diary all of the data excerpts pertaining to her experiences of received feedback from her supervisors in two teaching practicums in teacher training school. The data set was then read through by all the authors in a holistic manner several times to form preliminary ideas of Esteri's experiences of received feedback from her supervisors. We continued the process of analysis by emplotting Esteri's narrative. Polkinghorne (1995)



suggests that in a narrative, “events and actions are drawn together into an organized whole by means of a plot” (p. 7). Therefore, the process of emplotting a narrative is more than a simple chronological listing of events; it is also about at configuring the data to provide a explanation for an individual's decisions and experiences (Polkinghorne, 1995). Esteri's narrative was constructed with the outcomes in mind, and it includes the most significant events and reflections that explain how the outcome came about; how Esteri interpreted the received feedback. While we respected the chronological order of the events, we also wanted to structure the narrative into two parts corresponding to two teaching practicums and different supervising teachers Esteri has worked with. We present the result of this analytical phase—a coherent narrative, which provides a holistic view of Esteri's experiences and of the feedback she received during the teaching practicum (see also Kaasila, 2007a) in the results section.

In the second phase of analysis, we began looking more closely at the content of Esteri's narrative—what was actually communicated in the episodes that Esteri narrated as well as the ways she communicated about them. The second author, who conducted the wider study formed initial, data-driven interpretations. Then the first and the third authors were asked to interpret the same data set independently. The authors continued with the debriefing sessions in which their readings of the Esteri's experiences were discussed for further comparison. The authors reached agreement that several aspects of what was narrated by Esteri, resonated with the research on mindsets, which is why in the final phase of interpretations Esteri's experiences were interpreted in the light of the mindset theory. In doing that, we searched for the evidence of either fixed or growth mindset, such as what Esteri focused on when she receives the feedback, what kind of attributions she made in case of negative events or failure, what kind of affect and reactions from her side could be identified in her narrative and what kind of feedback she was actually pleased with and receptive to (Forsythe & Johnson, 2017; Jonsson & Beach, 2012; Rissanen et al., 2018). We paid close attention also on the kind of feedback she has received, and whether the feedback resonated with fixed or growth mindset. For example, based on the literature on mindsets, we looked for hints of trait or person praise or process praise (Dweck et al., 1995; Rattan et al., 2012). While we use the mindset theory to interpret our data, it is important to note that no mindset intervention or training was provided for a pre-service teacher nor the supervising teachers. Additional investigator triangulation was used outside of the team of authors. Esteri's case was presented and discussed in a wider research group, where several researchers and teacher educators who work closely with pre-service teachers in teaching practicum offered their viewpoints and validated the authors' interpretations.

## RESULTS

### Esteri's Experiences of the Feedback Received in Her First Teaching Practicum

In the first practice teaching (basic practicum), Esteri taught three math lessons, one physics lesson, and two chemistry lessons. As it is usual in practice teaching, Esteri taught part of the lessons in a tandem, with another pre-service teacher. Esteri's supervisor was Eevi, who was a novice supervising teacher. Before her first mathematics lesson, Esteri felt very nervous:

“Planning tomorrow's math lesson is not going well. To have this lesson feels so terrible that my stomach is turning around and cramping. I already gave Hannele (another pre-service teacher) a warning that I might not be able to go to school tomorrow. I also called Eevi (the supervising teacher). Eevi encouraged me and said ‘stop the nervousness and take the stance—if you survive, you're done. With that (attitude), come to teach the lesson.’ The encouraging speech did not alleviate my nervousness but did not make it worse either. The lesson plan was OK with the encouragement of Eevi. Yes, it helped! Eevi told me after the lesson that “I am ‘natural teacher’. It is good to continue!” (Esteri's reflection before her first mathematics lesson)

The above excerpt describes authentically the beginning of Esteri's practice teaching, the nervousness and even the consideration of giving up or not showing up for scheduled teaching, feelings experienced by many pre-service teachers. The supervisor's role seemed to have been crucial in the moment of nervousness. While Eevi had the power to stir Esteri away from quitting prematurely, we can also observe that Eevi's advice highlighted some aspects that reflect a low growth or even a fixed mindset on the mindset continuum. One

aspect in supervisor's speech seemed to place attention on the end result of Esteri showing up in class, rather than the process, such as for example drawing attention to practicum being a learning opportunity and getting past the nervousness or showing up despite of it would encourage more of a growth mindset in Esteri, too. In addition, after her first mathematics lesson, Esteri received from Eevi very positive feedback with a person-oriented praise, one about Esteri's 'natural' ability to teach. While the praise seemed to have boosted Esteri's motivation to continue to teach, Eevi could have praised Esteri's courage for showing up despite of nervousness and anxiety, her strategies and invested effort, which all would display and promote more of a growth mindset. Given that these experiences are recounted by Esteri, it is possible that Eevi's feedback was more versatile and process-oriented, however, the fact that Esteri highlights this particular person-oriented praise also demonstrates what Esteri values and her mindset in that moment.

Esteri also taught two chemistry lesson jointly with other pre-service teachers. She reported on her experiences in what follows:

"In the group feedback discussion, we received feedback on Friday's chemistry lesson, and apparently my part did not include challenges. Eevi said: 'The way I gave instructions as I did was really clear and well-controlled. My way to help all students was good', I was really glad about the comment when Eevi said on 'how well I take responsibility for the entire class and for student learning.'" (Esteri's reflection on the first chemistry lesson)

"Today we received feedback on yesterday's chemistry lesson. Eevi said that it was a good lesson. Burning hair was a 'fun' demo, as it certainly made it clear to everyone how the hair burns and that it flares up and burns in minutes. My strength as a teacher, she said, is creativity. I come up with all kinds of 'fun' things, and that I take responsibility for the students' learning." (Esteri's reflection on the second chemistry lesson)

Esteri received feedback pertaining to the responsibility she was able to take for the entire class in her chemistry lesson. This praise seemed to be particularly meaningful to Esteri, as she also later continued: "It's another memorable moment in the teaching practice year so far". The feedback Esteri received on the first chemistry lesson was more process oriented, focused on the ways Eevi handled the instruction and students, which allowed for learning from it. The line of positive feedback continued also with respect to Esteri's second chemistry lesson. Esteri was again praised for her qualities as a teacher, such as creativity and responsibility. In these data excerpts, we see the evidence of Esteri having received feedback that reflects a mixed mindset. First was a process-oriented feedback that encouraged the learning potential based on it and is reflective of a growth mindset, while the second feedback would be placed on the beginning part of the mindset continuum, reflecting supervising teacher's low growth or fixed mindset. Moreover, it also seems that Esteri values the latter kind of praise and that it has had a particularly positive impact on Esteri.

In the final supervision discussion, however, a turning point occurred:

"Eevi said that 'my strengths are integrity and the consideration and involvement of weaker students'. Then Eevi was thoughtful for a long time. But later she said that 'in the lessons, my weakness is in the subject matter'. And for me it was horrible to hear it because I have felt really insecure about my own substance all the time. Let's see how this training progresses and can I overcome my own insecurity..." (Esteri's reflection on the final supervision discussion in the first teaching practicum)

As opposed to praise she received earlier, Esteri above recounts more critical feedback she received. Eevi pointed out that all Esteri's lessons demonstrated a weakness in her subject-matter knowledge. It appears that this was Esteri's concern and insecurity all along, but until that point, she was not aware that also her supervisor was of the same opinion. Esteri seemed to be greatly affected by this feedback, displaying the feelings of insecurity. Surprisingly, Esteri does not reflect on the possible strategies she could use to act upon the feedback received, but instead, questions whether she will be able to go past this critique and own insecurity. The lack of proactivity in dealing with obstacles and feedback received could signal Esteri's fixed mindset.

### Esteri's Experiences of the Feedback Received in Her Second Teaching Practicum

The second teaching practice (advanced practicum 1) was more demanding because Esteri taught six math and one physics lesson alone. Kalle, her supervising teacher, had extensive experience of supervision. Bellow, Esteri talked about her first and second mathematics lessons she taught in 8<sup>th</sup> grade:

"The students were restless. Although the topic was easy, it still felt that most students did not understand it. There was a buzz all the time. The restlessness was disturbing throughout the lesson, and it made me give up from my plan to conduct some of my ideas by activating the students. The feedback discussion with Kalle at the end of the lesson was completely useless. I feel really repelled that I have to continue next Wednesday with the topic, when I do not know how this lesson went. I feel very irritated." (Esteri's reflection on the first mathematics lesson)

"During the lesson, we continued to solve the equations for the last time. I felt like the students had completely forgotten everything they had learned earlier. The pupils were completely lost when trying to solve basic exercises and could not complete the basic tasks. There was terrible restlessness among the students, and at the end of the lesson, pieces of rubber were flying around the class. The lesson was fully chaotic, and I did not really manage to keep the class under my control. At the end of the lesson, Kalle commented a bit, but not much. However, Kalle helped me with the planning of the next lesson." (Esteri's reflection on the second mathematics lesson)

As seen above, Esteri recognized that her first mathematics lesson did not go as it should have. Her reflection was focused mainly on students' behavior and classroom management. Due to the atmosphere and poor students' behavior in the class, she reported on deciding not to follow her original plan, which would include more active methods of learning and teaching. To this setback in teaching, Esteri reacts in a defensive manner as she blames students for not conducting her lesson as she initially planned it out. Esteri does not reveal the feedback she received from her supervisor, but it seems she was dissatisfied with the feedback and blamed the supervisor for the lack of feedback and for not knowing how to continue teaching. Interestingly, Esteri concludes she does not know how the lesson went, even though she recounted and seemed to be aware of many aspects showing that the lesson perhaps did not go as well as it should have. The second mathematics lesson was for Esteri a disappointment too. She remains to be focused on the class atmosphere and management. In addition, she was frustrated that students did not learn what was taught in the previous lesson. Despite of this negative teaching experience, Esteri reported she received guidance from Kalle with regards to planning her next lesson. Esteri taught her final mathematics lesson in teaching practice to the same 8<sup>th</sup> grade students, and had written the following:

"The students were able to listen when I was teaching the contents, and they were also doing the exercises actively all the time. In the feedback discussion, Kalle made it clear that my didactic approach was wrong and that I should not teach in that way. My feeling, on the other hand, was that this lesson was my best. But I felt that the supervisor was annulling it by criticizing my teaching method, despite the fact that it worked well and that the students were learning the topic! [...] From Kalle's viewpoint, my lesson never goes well. The practices in training school are very strange. If you feel that you succeed it is being annulled, and if you feel that you fail, the same thing! I kept the class under my control for the whole lesson, and the students listened to what I had to say, no one was chattering. Kalle was jealous of the silence that he did not get in his own lessons. Training school should be an appropriate training place for us trainees, but what kind of didactics is that the supervisors are barking all the time?!" (Esteri's reflection on the final mathematics lesson)

The final feedback Esteri received on mathematics teaching from her supervising teacher Kalle was directed at her didactic approach. It appears that Kalle would have wanted that the lesson would have been much more student centered and that such approach would be more suitable (Hasari, 2019, p. 100-101). Also, the first sentence in the reflection above (as well as prior reflections) indicates Esteri's teacher centered practices: for Esteri it was important that students were listening to her teaching. However, Esteri's impression of her own teaching of that particular mathematics lesson was different. She seemed to be very satisfied with



how it went; labeling it even as the lesson wherein she succeeded the most. It is evident that Esteri and her supervisor had differing views about this lesson. Esteri continued criticizing her supervisor; it appears that she did not feel sufficiently praised for the work she did in practice teaching, and therefore, not enough appreciated. She seemed especially satisfied about her class management skills and has reacted in a very defensive manner to Kalle's criticism. She went as far as to say that the feedback received from Kalle reflected his own inability to keep his class under control. Regardless of the kind of feedback supervising teacher provided, Esteri's reaction was strongly defensive alongside of blaming the supervisor, which may signal a somewhat fixed mindset. Esteri described the final feedback discussion with Kalle in what follows:

"Kalle said that I am a good teacher candidate because I take responsibility for student learning, and I take care that all students learn the subject matter. He also said that I answer the questions immediately and thoroughly and focus well on what is being taught. Kalle described me: 'Because I am so responsible and conscientious, my lessons give a tense/tough impression of me when I was too demanding towards the students, and when I assumed that the subject matter has already been adopted even though maybe it was not ...' [...] Kalle said I am too demanding towards the students in terms of silence and workload. Their own teacher (Kalle) is less demanding. Even though I adore, and I stand behind my decisions and my words, Kalle said I should not forget to relax and include the humor in my lessons. In this feedback, I learned all that I had hoped I would earlier. Kalle said that I should have asked from him for more feedback earlier. But how do you know that you can ask for more feedback because Kalle was not giving any clues that this is possible ..." (Esteri's reflection on the final feedback discussion)

At the very end of the teaching practicum, Esteri seemed to be satisfied with the praise she received about her strengths in teaching. Esteri was praised for many of her qualities as a teacher, and only minor weakness was mentioned by her supervisor. Esteri seemed to be particularly receptive for that kind of feedback, which was overall more person than process oriented. She was upset about the fact that this feedback came at the very final stage of practice teaching and was hinting she was not aware that asking for feedback is possible.

### Summary of the Findings

Two key themes and takeaways appear in Esteri's narratives regarding her experiences in two teaching practicums. The first theme relates to Esteri's reception of the feedback received. The findings demonstrate that Esteri seemed to believe that for the most part, she performed well and when feedback would support her beliefs and who she felt she was as a teacher, she was receptive to it. However, we observed that whenever the feedback included a critique, such as the one received from her second supervising teacher-Kalle, Esteri was unhappy about it and thought it did not do her justice. While Esteri preferred and responded well to praise, especially when person-oriented (Jonsson & Beach, 2012), she interpreted any kind of criticism as a major setback (Dweck, 2006). This kind of response to feedback signaled that Esteri on certain occasions in her second teaching practicum held a rather fixed mindset regarding her qualities as a teacher. In such a mindset, teaching practicum and the feedback received is a threat, instead of a learning opportunity. The feedback, indeed, was different from what Esteri thought of herself as a teacher, it threatened her identity (Lutovac & Kaasila, 2018) and we could observe Esteri's strong negative reactions to the feedback received, including defensiveness and helplessness (Forsythe & Johnson, 2017).

The second theme was related to the feedback given. While we only had an insight into the feedback through Esteri's words, interestingly though, we also observed that the supervision and feedback she received occasionally conveyed messages of fixed or low growth mindset. For example, her first supervising teacher focused on providing comfort and person-praise, of which both have been associated with fixed mindset (Rattan et al., 2012; Yeager & Dweck, 2012). While the supervisor thought she is helping Esteri, she has likely reinforced the idea of a natural talent in teaching and had undermined the meaning of effort and perseverance in the face of difficulties. These kinds of practices have also been found to even encourage fixed mindset in pre-service teachers, like Esteri (Rattan et al., 2012). In addition, based on Esteri's narratives, both supervisors provided a rather person-oriented feedback or praise instead of focusing on praising the process. For example, instead of praising Esteri for being creative, supervisors could praise the creative activities that her lesson included or creative ways Esteri found to plan and conduct her lessons.

## DISCUSSION

In this study, we explored one pre-service mathematics and science teachers' narrative about her experiences in teaching practice, and particularly her account of the kind of feedback she received from her supervisors. Esteri told a story in which we follow a promising beginning with a positive feedback received from her first supervisor, who praised her as a "natural teacher" (see also Walkington, 2005). Later, her narrative shifts in a rather negative direction; Esteri experiences some challenges and receives more critical feedback about her pedagogical approach from her second supervising teacher. This negative turn in her narrative led us to examine and problematize Esteri's mindset as evidenced in her reflection and reactions upon feedback received, but also the feedback and the circumstances in which this feedback arose. It is important to note that with this study, our aim was not to criticize Esteri's thinking and actions, but to amplify her experiences and raise awareness of how mindset can manifest itself in the practicum. In what follows, we discuss some of our observations in hopes to initiate a discussion on how to best support the development of future teachers like Esteri.

In Esteri's narrative, we identified several hints that made us interpret her beliefs and teaching practices regarding mathematics and science teaching as traditional and teacher-centered. For example, Esteri placed a lot of attention on the class atmosphere and management, especially on the students' behavior. This seems to be a point of reference for her and based on which she judged the success or failure of her lessons. She often reported about her delivery of the content, pupils needing to listen carefully and about pupils doing the tasks afterwards. Esteri also expected immediate outcomes from teaching and learning processes. For example, she thought that based on a single lesson where new content is introduced, students would be able to understand and apply the knowledge in the next lesson. We know, however, that many contents need to be taught and revisited over a longer period of time before students can understand and internalize that knowledge (Hiebert & Carpenter, 1992). This was a sign that Esteri's expectation of teaching and learning mathematics and science were quite unrealistic and her beliefs and practices of teaching still developing, which is a very common phenomenon when starting to teach (see also Lutovac et al., 2015; Lutovac & Kaasila, 2018). What was of concern though is how Esteri narrated about and reacted to the feedback received.

The kind of defensiveness and lack of receptiveness to feedback that Esteri displayed can pose a challenge for pre-service teachers' development. We know that for development to occur, pre-service teachers need to see a gap between the current and the desired situation, or their current and their desired teacher identities (Arnon & Reichele, 2007; Lutovac & Kaasila, 2011, 2014). Esteri's narrative shows that for Esteri, this gap is closed; she seems to be satisfied with who she is now as a teacher and believes that her approach is good. In addition, Esteri's narrative also shows that her deeply rooted teacher centered beliefs about mathematics teaching and her mindset might have hindered her experimentation in the teaching practicum, where she seemed to have played it safe in the classroom. The crucial point, however, is that her strong identity paired with occasionally displayed fixed mindset made her unreceptive for the critical feedback she received. Esteri found ways to justify for herself that the feedback received was unconstructive and irrelevant (Forsythe & Johnson, 2017). Rather than focusing on the effort or strategies she would need to assure the success in future teaching, she places attention on blaming supervising teachers for inadequate feedback (Hong et al., 1999; Yeager & Dweck, 2012). Esteri not only assigns the blame to the supervisors, but she is also quick to make negative judgements about them (Dweck et al., 1995). At times, Esteri even generalizes the feedback received and draws a conclusion that the training school in which the practice took place is deficient. While all the Esteri's claims about the supervising teachers and the training school could have been accurate, it was surprising that Esteri did not reflect at all on her learning process throughout and about the aspects she as a future teacher wishes to develop. This kind of self-development reflection and rhetoric, on the other hand, is something we often observed among Finnish pre-service teachers (Kaasila, 2007b; Lutovac & Kaasila, 2011, 2014) and might had signaled different mindsets. And lastly, while we paid close attention to understand Esteri's experiences and given that mindsets are context dependent, we felt compelled to consider also what kind of feedback was actually given to Esteri, which based on Esteri's reflections, on certain occasions conveyed messages consistent with fixed or low growth mindset. This suggests that teacher educators and supervising teachers too should pay close attention to their own mindsets and what these convey to pre-

service teachers (Jones et al., 2012). It would have been necessary that the supervising teachers as well as teacher education program would be promoting and empowering growth on the mindset continuum.

Stemming from our reading of Esteri's narrative, we believe that teacher education programs should consider the following. First, mindsets need to be challenged in teacher education. What this study teaches us is that mindsets should form a part of the teacher education course work preferably before pre-service teachers begin their teaching practice. Rissanen et al. (2018, 2019) have argued for the place of addressing the theory of mindset in pre-service teacher education, by explicitly teaching about it. This idea is also well supported by Dweck (2006) and Yeager and Dweck (2012) who have found success in interventions that involve teaching the participants about the research on mindset and giving them possibility to understand that the mindset can be changed. Second, provided that mindsets can be modelled, transmitted, as well as changed, training regarding the mindset theory and how it may impact the various aspects of teaching practices should also be available for educators, such as teacher educators and supervising teachers in schools. Third, this study showed the impact that mindset has on receptiveness to feedback, therefore it is crucial that pre-service teachers such as Esteri are taught to be receptive to feedback to be able to develop their teaching practices. While research has shown that feedback is important, student reception of the feedback and what they do with it may be even more so (Reinholz, 2016; Winstone et al., 2017). The receptiveness to feedback, particularly when pre-service teachers hold hindering fixed mindsets alongside of the teaching practices that are not aligned with what teacher education wants to promote, could be an important skill to focus on before pre-service teachers enter their teaching practicum. In this line, it is also crucial to spot a pre-service teacher's poor reception of feedback. For pre-service teachers like Esteri to feel less threatened and more receptive of the feedback received, perhaps more dialog and trust around feedback practices is needed (Walkington, 2005).

The data collection in this study was not specifically designed around the participants' reflections upon their mindsets or received feedback, which is one limitation that needs address. More robust findings would have been obtained if we would have a deeper insight into the feedback given, e.g., from the supervising teachers or a more elaborate reflection from Esteri on the feedback received. Additionally, the data in this study is drawn from the experiences of one pre-service teacher and therefore not robust enough to draw generalizable conclusions. We discussed earlier the choice of Esteri as a participant based on a critical and intense sampling strategy (Patton, 1990). While choosing Esteri as a critical case does not allow us to generalize our findings broadly, it does, however, permit logical generalizations. As Patton (1990) suggested, critical cases allow us to think in terms of "if it happens there, it will happen anywhere" (p. 174). This is precisely what we observed in teacher education courses, and what supervising teachers observe in teaching practicum –while cases like Esteri are not prevalent, we do come across them occasionally. This also makes it likely for other teacher educators and supervising teachers internationally to observe such cases in their practices. With this narrative case study, we hope, as Polkinghorne (2007) suggested, to have been able to convince readers of the plausibility that our claims can serve as a basis for understanding human action. By presenting Esteri's case, we wished to illustrate a certain kind, non-typical and yet observable pre-service teachers' thinking and actions regarding the practicum experiences. Further research, therefore, is needed involving larger number of research participants including a special focus on mindset in the data collection phase. It would also be interesting to observe the possible changes in pre-service teachers' mindsets when they would be exposed to mindset training between different practicums.

## CONCLUSION

This study intended to bring attention and give voice to those pre-service teachers who may struggle teaching during their teaching practice due to the feedback received. We problematized the role of the pre-service teacher's mindset in her experience of feedback received as well as the impact of her mindset on the reception of the feedback. While we identified that a pre-service teacher held frequently a fixed mindset based upon which she has judged the subsequent received feedback, this fixed mindset should not be understood as an individual pre-service teachers' problem. Instead, supervision practices and teacher education settings have a great power to clarify this process (Forsythe & Johnson, 2017; Rissanen et al., 2019).

We wonder whether Esteri got enough orientation earlier to see the teaching practice as a learning opportunity, rather than a setting where she should display to others her already well-formed traits and skills as a teacher. We conclude that a special care should be placed on guiding all pre-service teachers towards receptiveness to feedback well before the teaching practicum and especially to continuously revisit their mindsets regarding their qualities as teachers and teaching in general.

**Author contributions: MH:** Data collection design and execution. All authors were involved in concept, design, interpretation, writing and critically revising the article. All authors approve final version of the article.

**Funding:** This study was supported by the Academy of Finland [Grant numbers 307672 and 332232]. Academy of Finland exercised no oversight in the design and execution of the research, nor the writing of this article.

**Ethical declaration:** The authors declare that as per guidelines of Finnish National Board on Research Integrity TENK (<https://tenk.fi/en>), this study did not require an ethics committee approval. In Finland, only certain types of research need ethics committee approval (<https://tenk.fi/en/ethical-review/ethical-review-finland>). For research in humanities and social sciences involving human participants, the TENK has issued a set of guidelines on the ethical principles to be followed. As a research organization, University of Oulu has undertaken to comply with TENK's guidelines. The guidelines do not cover medical research as defined by law (Medical Research Act 488/1999) or other research designs where ethical review is a separate obligation laid down by law.

**Declaration of interest:** Authors declare no competing interest.

**Data availability:** Data generated or analyzed during this study are available from the authors on request.

## REFERENCES

- Anderson, J. (2021). *The agile learner: Where growth mindset, habits of mind, and practice unite*. Solution Tree Press.
- Arnon, S., & Reichel, N. (2007). Who is the ideal teacher? Am I? Similarity and difference in perception of students of education regarding the qualities of a good teacher and of their own qualities as teachers. *Teachers and Teaching: Theory and Practice*, 13(5), 441-464. <https://doi.org/10.1080/13540600701561653>
- Aronson, J., Fried, C., & Good, C. (2002). Reducing the effects of stereo-type threat on African American college students by shaping theories of intelligence. *Journal of Experimental Social Psychology*, 38, 113-125. <https://doi.org/10.1006/jesp.2001.1491>
- Bernecker, K., & Job, V. (2019). Mindset theory. In K. Sassenberg, & M. Vliek (Eds.), *Social psychology in action* (pp. 179-191). Springer. [https://doi.org/10.1007/978-3-030-13788-5\\_12](https://doi.org/10.1007/978-3-030-13788-5_12)
- Blackwell, L. A., Trzesniewski, K. H., & Dweck, C. S. (2007). Theories of intelligence and achievement across the junior high school transition: A longitudinal study and an intervention. *Child Development*, 78, 246-263. <https://doi.org/10.1111/j.1467-8624.2007.00995.x>
- Boyd, P., & Ash, A. (2018). Mastery mathematics: Changing teacher beliefs around in-class grouping and mindset. *Teaching and Teacher Education*, 75, 214-223. <https://doi.org/10.1016/j.tate.2018.06.016>
- Buhagiar, M. A. (2013). Mathematics student teachers' views on tutor feedback during teaching practice. *European Journal of Teacher Education*, 36(1), 55-67. <https://doi.org/10.1080/02619768.2012.678484>
- Clark, S. K., & Byrnes, D. (2012). Through the eyes of the novice teacher: Perceptions of mentoring support. *Teacher Development*, 16, 43-54. <https://doi.org/10.1080/13664530.2012.666935>
- Cohen, E., Hoz, R., & Kaplan, H. (2013). The practicum in preservice teacher education: A review of empirical studies. *Teaching Education*, 24, 345-380. <https://doi.org/10.1080/10476210.2012.711815>
- DeLuca, C., Coombs, A., & LaPointe-McEwan, D. (2019). Assessment mindset: Exploring the relationship between teacher mindset and approaches to classroom assessment. *Studies in Educational Evaluation*, 61, 159-169. <https://doi.org/10.1016/j.stueduc.2019.03.012>
- Dommett, E. J., Devonshire, I. M., Sewter, E., & Greenfield, S. A. (2013). The impact of participation in a neuroscience course on motivational measures and academic performance. *Trends in Neuroscience and Education*, 2, 122-138. <https://doi.org/10.1016/j.tine.2013.05.002>
- Dweck, C. S. (2006). *Mindset*. Random House.
- Dweck, C. S., Chiu, C., & Hong, Y. (1995). Implicit theories and their role in judgments and reactions: A world from two perspectives. *Psychological Inquiry*, 6(4), 267-285. [https://doi.org/10.1207/s15327965pli0604\\_1](https://doi.org/10.1207/s15327965pli0604_1)
- Forsythe, A., & Johnson, S. (2017). Thanks, but no-thanks for the feedback. *Assessment & Evaluation in Higher Education*, 42(6), 850-859. <https://doi.org/10.1080/02602938.2016.1202190>

- Gebhard, J., (2009). The practicum. In A. Burns, & J. C. Richards (Eds.), *The Cambridge guide to second language teacher education* (pp. 250-258). Cambridge University Press.
- Georgiou, S. N., Christou, C., Stavrinides, P., & Panaoura, G. (2002). Teacher attributions of student failure and teacher behavior toward the failing student. *Psychology in the Schools, 39*, 583-595. <https://doi.org/10.1002/pits.10049>
- Hasari, M. (2019). *Opettajien ammatti-identiteetin muotoutuminen matemaattisten aineiden opetusharjoittelussa* [The development of teacher identity in teaching practicum in the context of mathematics and science education] [Doctoral Thesis, University of Oulu].
- Hastings, W., & Squires, D. (2002). Restructuring and reculturing: Practicum supervision as professional development for teachers. *Asia-Pacific Journal of Teacher Education, 30*(1), 79-91. <https://doi.org/10.1080/13598660120114995>
- Hiebert, J., & Carpenter, T. P. (1992). Learning and teaching with understanding. In D. A. Grouws (Ed.), *Handbook of research on mathematics teaching and learning* (pp. 65-92). Macmillan.
- Hong, Y., Chiu, C., Dweck, C. S., Lin, D., & Wan, W. (1999). Implicit theories, attributions, and coping: A meaning system approach. *Journal of Personality and Social Psychology, 77*, 588-599. <https://doi.org/10.1037/0022-3514.77.3.588>
- Hudson, P., (2014). Feedback consistencies and inconsistencies: Eight mentors' observations on one preservice teachers' lesson. *European Journal of Teacher Education, 37*(1), 63-73. <https://doi.org/10.1080/02619768.2013.801075>
- Izadinia, M. (2015). A closer look at the role of mentor teachers in shaping preservice teachers' professional identity. *Teaching and Teacher Education, 52*, 1-10. <https://doi.org/10.1016/j.tate.2015.08.003>
- Izadinia, M. (2016). Student teachers' and mentor teachers' perceptions and expectations of a mentoring relationship: Do they match or clash? *Professional Development in Education, 42*(3), 387-402. <https://doi.org/10.1080/19415257.2014.994136>
- Jones, B. D., Bryant, L. H., Snyder, J. D., & Malone, D. (2012). Preservice and inservice teachers' implicit theories of intelligence. *Teacher Education Quarterly, 39*, 87-101.
- Jonsson, A. C., & Beach, D. (2012). Predicting the use of praise among pre-service teachers: The influence of implicit theories of intelligence, social comparison and stereotype acceptance. *Education Inquiry, 3*, 259-281. <https://doi.org/10.3402/edui.v3i2.22033>
- Jonsson, A. C., Beach, D., Korp, H., & Erlandson, P. (2012). Teachers' implicit theories of intelligence: Influences from different disciplines and scientific theories. *European Journal of Teacher Education, 35*, 387-400. <https://doi.org/10.1080/02619768.2012.662636>
- Kaasila, R. (2007a). Using narrative inquiry for investigating the becoming of a mathematics teacher. *ZDM, 39*(3), 205-213. <https://doi.org/10.1007/s11858-007-0023-6>
- Kaasila, R. (2007b). Mathematical biography and key rhetoric. *Educational Studies in Mathematics, 66*, 373-384. <https://doi.org/10.1007/s10649-007-9085-1>
- Kastberg, S., Lischka, A., & Hillman, S. (2019). Exploring mathematics teacher educator questioning as a relational practice: Acknowledging imbalances. *Studying Teacher Education, 15*(1), 67-81. <https://doi.org/10.1080/17425964.2018.1541278>
- Lieblich, A., Tuval-Mashiach, R., & Zilber, T. (1998). *Narrative research: Reading, analysis, and interpretation*. SAGE. <https://doi.org/10.4135/9781412985253>
- Lutovac, S. (2019). Pre-service mathematics teachers' narrated failure: Stories of resilience. *International Journal of Educational Research, 98*, 237-244. <https://doi.org/10.1016/j.ijer.2019.09.006>
- Lutovac, S., & Kaasila, R. (2011). Beginning a pre-service teacher's mathematics identity work through narrative rehabilitation and bibliotherapy. *Teaching in Higher Education, 16*(2), 225-236. <https://doi.org/10.1080/13562517.2010.515025>
- Lutovac, S., & Kaasila, R. (2014). Pre-service teachers' future-oriented mathematics identity work. *Educational Studies in Mathematics, 85*(1), 129-142. <https://doi.org/10.1007/s10649-013-9500-8>
- Lutovac, S., & Kaasila, R. (2018). An elementary teacher's narrative-identity work at two points in time two decades apart. *Educational Studies in Mathematics, 98*(3), 253-267. <https://doi.org/10.1007/s10649-018-9816-5>



- Lutovac, S., Kaasila, R., & Juuso, H. (2015). Video-stimulated recall as a facilitator of a pre-service teacher's reflection on teaching and post-teaching supervision discussion—A case study from Finland. *Journal of Education and Learning*, 4(3), 14-24. <https://doi.org/10.5539/jel.v4n3p14>
- Murphy, M. C., & Reeves, S. L. (2019). Personal and organizational mindsets at work. *Research in Organizational Behavior*, 39, 100121. <https://doi.org/10.1016/j.riob.2020.100121>
- Myers, M. D., Nichols, J. D., & White, J. (2003). Teacher and student incremental and entity views of intelligence. The effects of self-regulation and persistence activities. *International Journal of Educational Reform*, 12(2), 97-117. <https://doi.org/10.1177/105678790301200202>
- Orosz, G., Péter-Szarka, S., Böthe, B., Tóth-Király, I., & Berger, R. (2017). How not to do a mindset intervention: Learning from a mindset intervention among students with good grades. *Frontiers in Psychology*, 8, 311. <https://doi.org/10.3389/fpsyg.2017.00311>
- Patrick, S. K., & Joshi, E. (2019). 'Set in stone' or 'willing to grow'? Teacher sensemaking during a growth mindset initiative. *Teaching and Teacher Education*, 83, 156-167. <https://doi.org/10.1016/j.tate.2019.04.009>
- Patterson, M. M., Kravchenko, N., Chen-Bouck, L., & Kelley, J. A. (2016). General and domain-specific beliefs about intelligence, ability, and effort among preservice and practicing teachers. *Teaching and Teacher Education*, 59, 180-190. <https://psycnet.apa.org/doi/10.1016/j.tate.2016.06.004>
- Paunesku, D., Walton, G. M., Romero, C., Smith, E. N., Yeager, D. S., & Dweck, C. S. (2015). Mind-set interventions are a scalable treatment for academic underachievement. *Psychological Science*, 26, 784-793. <https://doi.org/10.1177/0956797615571017>
- Polkinghorne, D. E. (1995). Narrative configuration in qualitative analysis. In J. Hatch, & R. Wisniewski (Eds.), *Life history and narrative* (pp. 5-23). Falmer. <https://doi.org/10.1080/0951839950080103>
- Polkinghorne, D. (2007). Validity issues in narrative research. *Qualitative Inquiry*, 13, 471-487. <https://doi.org/10.1177/1077800406297670>
- Rattan, A., Good, C., & Dweck, C. S. (2012). 'It's ok not everyone can be good at math': Instructors with entity theory comfort (and demotivate) students. *Journal of Experimental Psychology*, 48, 731-737. <https://doi.org/10.1016/j.jesp.2011.12.012>
- Reinholz, D. (2016). The assessment cycle: A model for learning through peer assessment. *Assessment & Evaluation in Higher Education*, 41(2), 301-315. <https://doi.org/10.1080/02602938.2015.1008982>
- Rissanen, I., Kuusisto, E., Hanhimäki, E., & Tirri, K. (2018). Teachers' implicit meaning systems and their implications for pedagogical thinking and practice: A case study from Finland. *Scandinavian Journal of Educational Research*, 62, 487-500. <https://doi.org/10.1080/00313831.2016.1258667>
- Rissanen, I., Kuusisto, E., Tuominen, M., & Tirri, K. (2019). In search of a growth mindset pedagogy: A case study of one teacher's classroom practices in a Finnish elementary school. *Teaching and Teacher Education*, 77, 204-213. <https://doi.org/10.1016/j.tate.2018.10.002>
- Tang, S. Y. F. (2004). The dynamics of school-based learning in initial teacher education. *Research Papers in Education*, 19(2), 185-204. <https://doi.org/10.1080/02671520410001695425>
- Tewell, E. (2020). The problem with grit: Dismantling deficit thinking in library instruction. *Portal: Libraries and the Academy*, 20(1), 137-159. <https://doi.org/10.1353/pla.2020.0007>
- Walkington, J. (2005). Becoming a teacher: Encouraging development of teacher identity through reflective practice. *Asia-Pacific Journal of Teacher Education*, 33(1), 53-64. <https://doi.org/10.1080/1359866052000341124>
- Winstone, N. E., Nash, R. A., Rowntree, J., & Parker, M. (2017). 'It'd be useful, but I would not use it': Barriers to university students' feedback seeking and recipience. *Studies in Higher Education*, 42(11), 2026-2041. <https://doi.org/10.1080/03075079.2015.1130032>
- Wood, J. L., & Harris III, F. (2016). *Teaching boys and young men of color: A guidebook*. Lawndale.
- Yeager, D. S., & Dweck, C. S. (2012). Mindsets that promote resilience: When students believe that personal characteristics can be developed. *Educational Psychologist*, 47(4), 302-314. <https://doi.org/10.1080/00461520.2012.722805>
- Yeager, D. S., Hanselman, P., Walton, G. M., Murray, J. S., Crosnoe, R., Muller, C., Tipton, E., Schneider, B., Hulleman, C. S., Hinojosa, C. P., Paunesku, D., Romero, C., Flint, K., Roberts, A., Trott, J., Iachan, R., Buontempo, J., Yang, S. M., Carvalho, C. M., ..., & Dweck, C. S. (2019). A national experiment reveals where a growth mindset improves achievement. *Nature*, 573(7774), 364-369. <https://doi.org/10.1038/s41586-019-1466-y>



- Yeager, D. S., Trzesniewski, K., Tirri, K., Nokelainen, P., & Dweck, C. S. (2011). Adolescents' implicit theories predict desire for vengeance after remembered and hypothetical peer conflicts: Correlational and experimental evidence. *Developmental Psychology*, 47, 1090-1107. <https://doi.org/10.1037/a0023769>
- Yuan, R., & Lee, I. (2016). 'I need to be strong and competent': A narrative inquiry of a student-teacher's emotions and identities in teaching practicum. *Teachers and Teaching: Theory and Practice*, 22(7), 819-841. <https://doi.org/10.1080/13540602.2016.1185819>

