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In search of a growth mindset pedagogy: A case study of one teacher's classroom practices in a Finnish elementary school

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HIGHLIGHTS

- Core features of growth mindset pedagogy: process focus, mastery orientation, persistence, individualized student support.
- Growth mindset pedagogy includes the recognition and countering of students' fixed mindset behaviors.
- Growth mindset pedagogy is hampered by relying on the motivating power of success.
- Trait-focused pedagogy is sometimes implemented only for academically competent students.
- Teachers must develop understanding of academically competent students as fragile students in need of support.

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ABSTRACT

In this article we take up the two-fold task of creating a framework for a growth mindset pedagogy on the basis of our previous studies and exploring the critical points of this pedagogy in the classroom of a mixed-mindset teacher. The data include classroom observations and stimulated recall interviews. The results show how a teacher who is socialized into the Finnish educational system pursues core features of growth mindset pedagogy, despite not having a dominant growth mindset herself. However, we identify critical points in her practices, which suggest that teaching the theory of mindset in teacher education is needed.

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1. Introduction

Carol Dweck's (2000, 2006) theory of mindsets deals with implicit beliefs that individuals hold about basic human qualities. People with a growth mindset (also called incremental theory) believe that intelligence, personality, and abilities can be developed. People with a fixed mindset (also called entity theory) believe that these basic qualities are static and unalterable. People have

general tendencies toward one mindset or the other, but it is also common to have different mindsets in various domains of the self and others (e.g., intelligence, personality, giftedness) (Kuusisto, Laine, & Tirri, 2017; Molden & Dweck, 2006). Different mindsets provide an explanation for why students with equal abilities in the same situation have different achievement goals and behavioral patterns and thus exhibit differences in learning processes and outcomes (Dweck & Leggett, 1988). Students with a fixed mindset emphasize performance goals ("looking smart," "proving their abilities") and tend to avoid challenges, whereas students with a growth mindset emphasize learning goals ("becoming smart," "improving abilities"), appreciation of effort, and understanding failures as learning opportunities (Dweck & Leggett, 1988; Mangels,

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Butterfield, Lamb, Good, & Dweck, 2006). Students with a growth mindset have been found to have higher achievements during challenging school transitions, and these students' completion rates in demanding school courses are greater (Blackwell, Trzesniewski, & Dweck, 2007; Yeager & Dweck, 2012).

Mindsets are relatively stable, but they can also be altered by educational interventions. Even brief interventions have had long-lasting effects on students' motivation and achievement. The main feature of such interventions has been to teach students about the neuroplasticity of the brain and its potential to change and reorganize whenever people learn and practice new ways of thinking (Blackwell et al., 2007; Dweck, 2012; Paunesku, 2013; Rattan, Good, & Dweck, 2012; Yeager & Dweck, 2012; Yeager & Walton, 2011). It has also been found that teachers play a critically important role in supporting these classroom interventions (Schmidt, Shumow, & Kackar-Cam, 2015). Furthermore, teachers' perceptions of the causes of students' behavior and particularly their implicit beliefs about intelligence powerfully shape their own behaviors and interactions with students (Georgiou, Christou, Stavrinides, & Panaoura, 2002; Rattan et al., 2012; Rissanen, Kuusisto, Hanhimäki, & Tirri, 2018a,b; Ronkainen, Kuusisto, & Tirri, 2018). With subtle cues delivered through the language they use, teachers can shape students' views of their own abilities and influence their motivation and achievements (Cimpian, Arce, Markman, & Dweck, 2007; see also; Schmidt et al., 2015). Teachers with an entity theory more often praise their students' qualities (Jonsson & Beach, 2012; Rissanen et al., 2018a) or comfort students for their limited ability when they are failing (Rattan et al., 2012), which may have negative effects on student perseverance and motivation (Mueller & Dweck, 1998). Furthermore, teachers' mindsets about intelligence predict their views of their own responsibility for student performance: teachers with fixed views of student ability see themselves as being less responsible for students' academic performance (Patterson, Kravchenko, Chen-Bouk, & Kelley, 2016) and may be less responsive to pedagogical education (Rissanen et al., 2018a).

However, research has mainly focused on interventions, which are often conducted by researchers, while the actualization of teachers' mindsets in the classroom and teachers' everyday pedagogical practices in general, which continuously shape students' mindsets, remain understudied. In three exploratory case studies that included classroom observations and stimulated recall interviews with a total of six teachers, we have previously examined how teachers with a general tendency toward either a fixed or a growth mindset make sense of their students' behavior, learning, and achievements and how this meaning-making influences the teachers' understanding of the teaching-studying-learning process and their classroom practices in general (Rissanen et al., 2018a; Ronkainen et al., 2018), and specifically with respect to moral education (Rissanen et al., 2018b). These studies give evidence of the implications of teachers' mindsets to their pedagogical practices, and, along with studies that depict teachers' role in shaping mindsets (e.g., Jonsson & Beach, 2012; Rattan et al., 2012; Schmidt et al., 2015), they show the need to strengthen connections between the research on mindsets and the fields of teaching and teacher education. There have been no systematic efforts to delineate the core tenets of what could be called a *growth mindset pedagogy* – pedagogy that is likely to cultivate a growth mindset in students and is associated with the teacher's own growth mindset.

Thus, in this article we take up a two-fold task. First, on the basis of our previous studies, we create a framework for a growth mindset pedagogy in basic education, which gathers together key features of classroom practices associated with a teacher's incremental meaning system (a network of beliefs connected to growth mindset; e.g., Plaks, Levy, & Dweck, 2009). Second, we try to develop the framework further by finding answers to unresolved

questions through a case study. Even though the results of our previous case studies indicate a link between teachers' dominant growth mindset and certain features in their pedagogical thinking and practices, these results have also raised questions: to what extent can a growth mindset pedagogy be regarded as the practice of a single teacher and dependent on the teacher's own mindset, and to what extent does it stem from the larger educational system that relies on the core features of growth mindset pedagogy? Furthermore, is socialization into this educational system in teacher education sufficient for promoting a growth mindset pedagogy, or are there some critical points that would require teachers to become familiar with the theory of mindsets and its pedagogical implications? In order to explore these issues, we present Finland as a case example of an educational system which leans toward a growth mindset pedagogy, and we show the results of a case study of a Finnish teacher who is fully socialized into the Finnish educational system, but does not herself have a dominant growth mindset.

2. Growth mindset pedagogy

2.1. Core features of a growth mindset pedagogy based on process-focused pedagogical thinking

A growth mindset is commonly associated with process focus, which means that behavior is explained by means of contextual factors and psychological forces. People with a fixed mindset are more trait-focused and tend to interpret behavior in terms of personality traits and abilities (Chiu, Hong, & Dweck, 1997; Molden, Plaks, & Dweck, 2006; Plaks et al., 2009). Our previous studies (Rissanen et al., 2018a,b; Ronkainen et al., 2018) revealed how teachers with a growth mindset rely strongly on *process-focused pedagogical thinking*. This means they regard emotional processes, learning strategies, and contextual factors as the main indicators of students' behavior, learning, and achievements and try to influence these factors instead of seeking explanations in fixed abilities. The core features of a growth mindset pedagogy, which we have identified in natural classroom settings, can be traced to the process-focused pedagogical thinking of teachers (see Table 1).

Supporting *student's individual processes* (see Table 1) is important for a teacher who does not seek reasons for students' successes and failures in their fixed qualities, but rather understands that the individual cocktail of psychological processes, contextual factors, and learning strategies influences a student's learning process and may create barriers to motivation and learning; identifying these barriers and helping students to overcome them is a teacher's job. Teachers with a growth mindset are less likely to make quick, stereotypical judgments about students' talents or moral character than teachers with a fixed mindset, and they spend more time in one-on-one interactions with students in order to get to know them and give them individualized support. Furthermore, differentiation becomes the basis of pedagogical practice in a growth mindset pedagogy.

Process-focused pedagogy implies *promoting a mastery orientation in the classroom* (see Table 1), where progress and learning goals are emphasized and performance or achievements are not deemed as relevant. This means, for instance, that the emphasis is strongly on formative instead of summative assessment. Students are not encouraged to compete and compare their achievements with other students, but rather to analyze their own progress and learning. We found that teachers with a dominant fixed mindset tend to start custom-tailoring their goals and teaching content to the students' talents; furthermore, such teachers consider their primary aims as a teacher to be evaluating students' achievements fairly. In the domain of moral education, teachers with a fixed

Table 1

Core features of growth mindset pedagogy in basic education (on the basis of Rissanen et al., 2018a,b; Ronkainen et al., 2018).

Growth mindset pedagogy in basic education
is pedagogy that is likely to cultivate a growth mindset in students and is associated with the teacher's own growth mindset and process-focused pedagogical thinking.
Supporting student's individual learning processes
<ul style="list-style-type: none"> • Avoiding quick, stereotypical judgments of students • Frequent one-on-one interactions with students • Learning about individual student's barriers to learning and helping students overcome them • Differentiation as the basis of pedagogical practice
Promoting mastery orientation
<ul style="list-style-type: none"> • Fostering learning goals • Emphasis on formative assessment • Avoiding comparisons to other students
Persistence
<ul style="list-style-type: none"> • Not giving up on students and leaving no room for helpless behavior patterns • Not protecting students from challenges • Honest critical feedback in the form of "not yet"
Fostering students' process-focused thinking
<ul style="list-style-type: none"> • Praising courage, strategies, and effort • Teaching the positive role of failures, mistakes, and challenges in learning • Fostering students' incremental beliefs and situational attributions • Teaching learning strategies and emphasizing learning-to-learn goals

mindset were focused on achieving justice through punishments, while teachers with a growth mindset endeavored to promote moral growth in a more holistic manner.

Another thing we have found to be common among teachers with a dominant growth mindset is *persistence* (see Table 1). This means that a teacher is rather strict and does not give up on students or leave room for helpless behavior patterns, but expects good behavior and tirelessly demands that students put effort into studying. Persistent teachers have a firm belief in a teacher's power to influence students' studying-learning processes and in developing students' moral character. In our observations, fixed mindset teachers sometimes seemed to protect students (especially the ones they regard "weak") from challenges and all kinds of criticism, and to use comforting feedback (see also Rattan et al., 2012), but teachers with a growth mindset more courageously give guidance through honest critical feedback – for instance, by using the words "not yet", which leaves space and gives hope for improvement and motivation to continue (Ronkainen et al., 2018).

Central to the concept of growth mindset pedagogy is that such teaching promotes a growth mindset. Students' growth mindset and appreciation of persistence and effort correlates with not being thrown by failure, but rather in seeing failures as opportunities for learning (Dweck, 2000, 2006, 2010; Blackwell et al., 2007; Molden & Dweck, 2006). We have found that teachers with a growth mindset and a tendency to engage in process-focused pedagogical thinking are also likely to *foster students' process-focused thinking* (see Table 1) associated with a growth mindset. A key factor here is the kind of student feedback such teachers provide: they tend to praise courage, strategies, and effort instead of achievements and personal qualities. By emphasizing learning-to-learn goals and teaching learning strategies, growth mindset teachers help students, both explicitly and implicitly, to find reasons for their difficulties outside their personal qualities and thereby foster incremental beliefs. They help students cope with mistakes and teach how failures and challenges play roles as learning opportunities. We did not measure student outcomes, but Schmidt et al. (2015) have shown how these kinds of "growth mindset messages" together with a teacher's process-focused practices support students' growth mindset and are linked with students' better academic achievement in the long term.

2.2. Growth mindset pedagogy in the Finnish educational system

There are many features in the Finnish educational system that

can be regarded as important enablers of growth mindset pedagogy. In general, the goal of education, as described in the current *National core curriculum for basic education* (Finnish National Agency of Education, 2014), is to educate responsible citizens who are able to realize their fullest potential; the aims of learning-to-learn are strongly emphasized. A mastery-oriented atmosphere and implementation of learning goals instead of achievement goals are enabled by the minor role given standardized testing and externally determined learning standards (Finnish National Agency of Education, 2014). Further, the educational system is based on trusting the professionalism and autonomy of teachers (Tirri, 2014). *Assessment for learning* – assessment that guides and promotes learning – is highlighted in the new national core curriculum: "In all grades, assessment during the studies mainly consists of guidance of learning through feedback. Its key objective is to guide and encourage studies, support learning and promote the skills of self-assessment and peer assessment" (Finnish National Agency of Education, 2014, p. 86).

Furthermore, since the 1970s, the main principle of Finnish education has been to maintain equality, which is manifested in the care given to the weakest students, such as children with learning difficulties (Tirri & Kuusisto, 2013; Uljens & Nyman, 2013). Teachers are expected to tailor their teaching practices in a way that considers students' individual characteristics, needs, and interests. The development of the child as a whole is emphasized, and individually personalized student support is provided by multi-professional teams. However, this kind of growth mindset pedagogy has not been applied to gifted students, for whom opportunities to learn and develop by doing challenging tasks have been almost systematically neglected. In Finland, gifted education has depended on individual teachers, since neither the educational system nor teacher education programs have addressed the topic (Laine, Kuusisto, & Tirri, 2016; Laine & Tirri, 2016). Still, it is important to point out that, for the first time in the history of Finnish curricula, the curriculum published in 2014 mentions talented students and acknowledges their learning needs (Finnish National Agency of Education, 2014). It can be stated that, traditionally, a Finnish growth mindset pedagogy has been built up especially for supporting the growth and development of students with learning difficulties, but the current development is gradually broadening the scope to include gifted and talented learners as well.

The current national core curriculum, in describing the concept of learning, emphasizes the importance of students' self-image, self-efficacy, and self-esteem in learning processes and in

motivation. It states that students' trust in their potential should be reinforced through positive and realistic feedback (Finnish National Agency of Education, 2014). A growth mindset pedagogy also recognizes the importance of students' ideas about themselves as learners. However, in contrast to the emphasis in the Finnish curriculum on students' trust in their own potential, research on mindsets indicates that students' incremental beliefs – trust in the malleability of their qualities – is the basis for motivation that endures through setbacks and failures (Yeager & Dweck, 2012).

According to quantitative studies, a growth mindset is more typical of Finnish teachers than is a fixed mindset, as measured by Dweck's scale (Laine et al., 2016; Laine & Tirri, 2016), similar to teachers in the United States (Gutshall, 2013, 2014). However, there are also reasons to suspect that Dweck's instrument provides overly positive results, since incremental views were not evident in Finnish teachers' open definitions of giftedness (Laine et al., 2016). Previously, Finnish teachers have also been found to support “the theory of natural giftedness,” which holds that intelligence is a fixed capacity (Räty & Snellman, 1998). Furthermore, while Finnish teachers seem to regard the academic competence of poorly achieving students as malleable, they hold more fixed views of the competence stability of high achievers (Rissanen et al., 2018a; Kärkkäinen & Rätty, 2010). In order to develop agendas for teacher education programs, more in-depth qualitative studies are needed to increase understanding of the domains in which teachers typically hold entity or incremental beliefs and to determine how these beliefs influence their pedagogical thinking and practices.

3. Data and methods

3.1. Study design

The data collected for this study are part of a larger research project at the Helsinki Collegium for Advanced Studies at the University of Helsinki. The Copernicus Project aims at changing learning mindsets among students, teachers, and parents, and project members collect psychological, educational, and neuroscientific evidence for these changes. The methods include large quantitative surveys, interviews, and observations in the classroom as well as interventions and brain measurements. We also collect multiple-case studies from teachers at different grade levels to determine how teachers with different mindsets implement growth mindset pedagogy in their classroom. The aim is to recognize the current situation, identify the pre-intervention practices of teachers, and develop growth mindset pedagogy for future interventions in schools and for teacher education programs. Thus far, the research conducted in the project has shown evidence of the implications of teachers' mindsets for their pedagogical practices (as described above), but it has also led us to hypothesize that some core features of growth mindset pedagogy could be rooted in the educational system in a way that teachers without a dominant growth mindset are likely to pursue. We have observed teachers with particularly strong dominant fixed or growth mindsets, yet more data are needed on the actualization of growth mindset pedagogy in the practices of teachers who do not hold either a strong growth or fixed mindset. We are interested in determining the critical points of growth mindset pedagogy that would demand focused teacher education interventions in an educational system that generally leans on process-focused pedagogy. The present case study explored the pedagogical thinking and practices of one Finnish class teacher, Anne (a pseudonym). By observing Anne, we were able to examine what might be missing from otherwise good and effective pedagogy in the absence of the teacher's growth mindset and knowledge of the mindset phenomenon; in other words, what would be the added value of a growth mindset

pedagogy? The research questions for the study are the following:

1. How is a growth mindset pedagogy actualized in Anne's pedagogical thinking and practice?
2. What are the critical points of Anne's pedagogical thinking and practice? Where are her entity beliefs communicated to the students or where does she otherwise fail to promote a growth mindset in her students?

3.2. Teacher observed in this study

Anne is a class teacher. In Finland, at the level of basic education (grades 1 to 6), the teaching of all subjects is generally given by a single class teacher. As will be shown below, Anne is also a teacher educator herself and supervises practicing student teachers in her classroom. She can therefore be regarded as a teacher who is expected to represent the ideals of the Finnish educational system and Finnish teacher education.

The reason for choosing Anne as the subject of this study was that she can be regarded as an experienced, skilled, and reflective teacher, yet one who does not have a particularly strong incremental belief system. Instead, she shows a general tendency toward what could be called a “mixed mindset” (Laine et al., 2016) and in some domains would be classified as a fixed mindset. Anne participated in a survey that measured teachers' ($n = 63$) mindsets in a teacher training school of a Finnish university using Carol Dweck's mindset inventory (Dweck, 2000; Kuusisto et al., 2017). The teachers were asked to evaluate their attitudes to eight statements on a six-point Likert scale (1 = strongly agree, 6 = strongly disagree), of which four statements were related to intelligence and four to giftedness. Mean scores of 1.0–3.0 indicated a fixed mindset; 3.1–3.9 showed a mixed mindset; and 4.0–6.0, a growth mindset. A sample item is: “Your intelligence (giftedness) is something about you that you cannot change very much.” Anne's scores indicated that she had a tendency to a fixed mindset regarding intelligence ($M = 3.0$) and a mixed mindset regarding giftedness ($M = 3.75$). In open-ended questions, she defined intelligence as an individual's quality that has a significant impact on learning and living. She described giftedness as an inherent ability to master certain areas of life and being more skilled than others in the same age group, but she also mentioned that, without work and effort, giftedness will narrow. However, when asked what she thinks mostly influences student success and failure on tests and exams, she did not mention students' inherent qualities, but instead referred to motivation, teaching, and studying together with support from home and other contextual factors. Thus, on the basis of her answers, Anne was identified as a teacher with no strong tendency to either a fixed or a growth mindset. This perception was confirmed in the preliminary interview. Her pedagogical thinking reflected the general tendencies of the Finnish curriculum, in particular, an orientation toward supporting the holistic well-being of students and tailoring pedagogical practices according to students' individual needs. Anne described herself as a strict, but motherly teacher; it was important for her to create a learning environment where everyone can feel safe.

Anne was a skilled class teacher with specializations in primary education, mother tongue education, special education, and biology. She had ten years of teaching experience and was at that time teaching a first-grade class with 21 students – 11 girls and 10 boys. Three of the students spoke Finnish as a second language. Often in her classroom, there was also a special-needs assistant, which made it possible to divide the class into two small groups taught separately. As part of her job, Anne was also supervising student teachers in her classroom.

3.3. Method

The data for this study include a semi-structured preliminary interview, video-recorded classroom observations during the course of one week (a total of 19 observed lessons), and three stimulated recall (STR) interviews (a total of 96 min of recorded interview material). Before the actual recorded observations, a researcher responsible for the observations spent three days in the classroom developing an observation sheet. The observations were recorded with a GoPro camera, which could be controlled with a smart phone and enabled the observation of interactions in different parts of the classroom. During the STR interviews, 34 critical incidents during the lessons, first identified by the researcher using the videotapes, were watched with Anne. When interviewees view past actions using video recordings to stimulate memory, they are able to remember their past thoughts with greater validity (Tochon, 2009). In the STR interviews, Anne was asked to reflect freely on the critical incidents and give reasons for her actions in these situations. In this study, critical incidents were moments in which the researcher saw the teacher's implicit incremental or entity beliefs actualizing in the classroom.

The data were analyzed by means of qualitative content analysis (Elo & Kyngäs, 2008). In the analysis, we first identified deductively how the features of a process-focused growth mindset pedagogy (see Table 1) are actualized in Anne's pedagogical thinking and practice (research question 1). After that, we searched for critical points in Anne's growth mindset pedagogy, namely, instances in the data where Anne's entity beliefs were manifested in her pedagogical thinking and practice or other ways in which Anne struggled to cultivate the growth mindset of her students (research question 2). We coded and categorized these (see Table 2). This phase of analysis was based on our theoretical understanding of the phenomenon, but the categories were formed inductively.

4. Results

4.1. Actualization of a growth mindset pedagogy in Anne's classroom

Anne was rather strongly inclined to *process-focused pedagogical thinking*. She even serves as a very good example of how, in order to implement process-focused growth mindset pedagogy, considerable effort is required to get to know the students and support their *individual processes*. In the STR interviews, she emphasized that all her instructional decision-making is based on her understanding of the students' individual needs. Anne talked about differentiation as the basis on which all pedagogy is built:

Well, I have multiple and flexible methods for that. I don't put them into ability groups according to their reading skills. Rather

I organize the small groups in a way that I will be most likely to have time for teaching each individual student ... and then I differentiate using different tasks and different working methods, and, of course, whenever possible by using the help of the special-needs assistant so that we simply do different things in the classroom. Like, I have students who don't understand Finnish, and there is no point in their sitting still listening and getting frustrated when we are reading stories. (Preliminary interview)

The individually set process aims were not only related to learning the contents of teaching, but also to the aims of learning to work and learning to learn. Anne said, for instance, that it is important for the students first to learn to work individually, then in pairs, and eventually in small groups.

In her classroom, in many ways Anne fostered *mastery orientation* and learning goals instead of a performance-oriented atmosphere and achievement goals. She said, for instance, that in teaching first grade, she does not use exams for assessment; instead, assessment is based on the teacher's knowledge about students as individuals and their learning processes, an approach which is in the spirit of the Finnish national core curriculum (Finnish National Agency of Education, 2014) and puts emphasis on formative assessment. Anne regarded this as important because, in this way, students would learn that their exam results do not define them or their learning.

There were many features in Anne's practice that were likely to *foster students' process-focused thinking*. She praised strategies, progress, and effort and rarely used the kind of personal praise that teachers with a fixed mindset tend to use (Jonsson & Beach, 2012), which is likely to demotivate the students when they face challenges and failure (Mueller & Dweck, 1998). By giving constant feedback, Anne guided the actions of her students, motivated them to commit to the work, and developed their self-knowledge about their progress. In the following example, Anne does not praise the student's qualities, but rather the student's skills, and she continues by setting the next learning aim. This mode of communicating informs the student that there is no point in doing a task that is too easy; rather it is important constantly to find challenges that benefit learning:

Let's look back a bit, because you were absent when we worked with these ... well, you can start. You already draw such beautiful numbers so there's no point in practicing them now, but you can start from here. Tell me, how many balloons are here? (Observation data, Critical incident 28)

It was also typical of Anne to praise strategies and verbalize different learning strategies and methods of reasoning. For

Table 2

Critical points in Anne's growth mindset pedagogy.

Critical points

- Instances of *trait-focused pedagogical thinking*. Trait-focused interpretations concerning
 - students' personalities
 - academically competent students
- Not recognizing and actively countering students' fixed mindset behaviors
 - Misreading students' fixed mindset behavior as "overconfidence" or personality traits
 - Lack of persistence and lack of emotional support
- Relying on the motivating power of success
 - Not teaching all students how to cope with failure
 - Protecting some students from challenges
- Implementing trait-focused pedagogy for academically competent students
 - Trusting the competence stability of academically competent students
 - Teaching persistence and learning-to-learn skills mainly to weak students

example, in one of the mathematics lessons, students were doing calculations using bricks and a place value chart. One of the students came up with the right conclusion faster than the others. Instead of praising his speed, Anne asked the student to explain what method of reasoning he used, praised that, and then explained the method to the other students. In general, teaching learning strategies was of vital importance for Anne. For instance, in talking about the most important aims in her work, she mostly mentioned helping her students learn to study and learn to learn:

R: So what kinds of aims have you set for yourself as a teacher?

Anne: I hope my students will learn persistence and will become hard-working and learn to collaborate. Lots of things are involved in that; you have to respect others and value yourself too. I think these are the basics. (Preliminary interview)

In talking about the aims that should be accomplished during first grade, Anne mentioned the contents of teaching and learning last:

Anne: Well, working skills, the fact that you are able to work alone and concentrate ... everything begins with concentration ... and you learn how to understand different tasks and do them and how to pursue goals, and understand why some things are studied and what's the idea and reason behind it. And, of course, collaborating with others and behaving in such a way that you can work in groups ... and then of course the contents that should be covered during the first grade too. (Preliminary interview)

Through this way of emphasizing the importance of learning-to-learn skills, Anne implicitly fostered students' incremental beliefs and situational attributions; successes and failures in the classroom were generally interpreted in terms of strategies and processes instead of traits. Anne was of the opinion that making students understand that failures are inevitable is important, which is why she also regarded as important that students see teachers making mistakes:

Often I make mistakes by accident, but sometimes I make them on purpose, so that the children can see their teacher perhaps does not always know things. (Preliminary interview)

The pedagogical power of failure, according to Anne, relies on verbalizing and analyzing the thought processes that have led to the failure. Seeing failure as an inevitable part of the learning process is a natural part of the mastery-oriented atmosphere of a growth mindset pedagogy (see, e.g., Chiu et al., 1997). Anne was observed planning tasks in which students were almost certain to make mistakes, and she based her teaching on analyzing these mistakes, for she thought this was a good way of developing students' thinking. She tried to support the development of "grit" (Duckworth, Peterson, Matthews, & Kelly, 2007) in her students by requiring them to continue after failure:

I try to communicate that mistakes are ok and it's not very serious if you make them and somehow through that encourage them, like, let's just do this again and let's give it another try. (Preliminary interview)

However, more explicit ways of countering students' entity beliefs was missing, as will be shown in the section below on critical points of a growth mindset pedagogy. Furthermore, the most inconsistent feature of a growth mindset pedagogy in Anne's

pedagogical practice was *persistence*. While Anne generally demanded hard work and good behavior from her students, we observed critical incidents where she gave up this persistence. We will now turn to the critical points of Anne's growth mindset pedagogy.

4.2. Critical points of growth mindset pedagogy in Anne's pedagogical thinking and practice

4.2.1. Trait-focused interpretations of students' personalities and academically competent students

Anne's incremental beliefs and process-focused thinking seemed to be stronger in the domain of academic learning and weaker in the domain of personality. She emphasized contextual factors and the quality of teaching-studying processes whenever she gave explanations for students' learning, but she made more trait-focused interpretations of students' psychological qualities and personality traits. For instance, in the preliminary interview, she referred to students' qualities as indicators of learning in a trait-focused manner, but in these instances she did not mention intelligence or giftedness, but rather features of the students' personalities as factors that can make the interventions of educators and parents less likely to succeed:

R: So what do you think about the possibilities that students can grow and learn? What influences these possibilities?

Anne: There are so many things ... In a way, it is the students' ... the students themselves, of course, their family background, too ... but generally the students themselves and their qualities, their ways of working, ways of reacting, these things have a huge influence on their possibilities for learning and development... If there is a student, for instance, who reacts to everything with indifference, there are students like that, so we discuss with their parents ways to support these kids in school and also at home, assuming that they are not depressed or anything. It is just that there are temperaments like that ... I think we have to respect and appreciate these kids and the fact that this is part of the way they function, but of course there are a lot of things we can [do], or at least we can try to have an influence on. (Preliminary interview)

Furthermore, while Anne's process-focused interpretations of students' learning and achievements showed in the fact that she never described a student as lacking in ability, she referred to the students she regarded as gifted in a more trait-focused manner, describing them as "competent" or "able." These more fixed interpretations of students' personalities and academic competence led to instances of more trait-focused pedagogical thinking and practices, as will be demonstrated by the critical incidents described below and in Table 2.

4.2.2. Not recognizing or actively countering students' fixed mindset behaviors

Anne did not always actively counter her students' fixed mindset behaviors, such as helpless behavior patterns and the avoidance of challenges (see, e.g., Yeager & Dweck, 2012). In cases where students expressed helpless behavior patterns and were giving up, she helped them find new strategies and encouraged them to continue working, but she did not directly discuss or help the students handle their emotions in these situations, and was not very persistent in her demands. Anne's efforts to identify the barriers to learning among students who did not feel comfortable in a learning situation were markedly weaker than what we observed with the teachers who had strong dominant growth mindsets

(Rissanen et al., 2018a,b; Ronkainen et al., 2018). Apparently, she interpreted the uneasiness of students to be caused by fixed traits (such as shyness) and believed there was not much she could do to help them. In one lesson, a student was lying on his desk. Anne asked him to sit up properly and modeled a better study posture. The student obeyed, but soon afterwards sank back into his lying-down position. Here is how Anne reflected on the situation in the STR interview:

He is the kind of student who is not very open to receiving any kind of support or help, and he has a strong conviction that he is very able and knows everything and, in reality, quite often he does not. So I have to be very sensitive with him, and, like now, this posture of his is one indication that he is not very willing to work ... but he did not mind me correcting him. He tried and later on I noticed again that he tried to take a better posture, so step by step they will mature. (STR interview, Critical incident 8)

In other interviews, Anne described this student as very challenging because he is “so certain of himself,” yet he lacks persistence and does not accept help from a teacher when things get difficult. Instead, he gives up. The kind of overconfidence Anne describes here is typical of students with a fixed mindset and is preserved, in part, by doing easy tasks rather than more difficult ones (Ehrlinger, Mitchum, & Dweck, 2016). Furthermore, fixed mindset students, who are more concerned with appearing smart than becoming smart, have a greater tendency to engage in self-handicapping behavior and avoid putting effort into studying (Rhodewalt, 1994). The behavior of the student in the quotation above may also reflect these tendencies. However, Anne was not able to recognize these dynamics as possible causes of her student's behavior and thereby challenge his fixed mindset.

4.2.3. Relying on the motivating power of success

Despite the fact that Anne told us she believes in the pedagogical power of failure, in practice she seemed to rely more on the motivating power of success rather than helping her students handle negative emotions by attributing their failures to things other than their personal qualities:

I feel that first graders have a very natural motivation to learn. I guess they should have enough experience of success and experience mastering things so that their self-conceptions as learners grow, like, I know things and I can do things It is not a thing that would develop or that would be lost suddenly or in a short time, but like ... I think it is a process of growing to become a school kid and growing to become a student. (Preliminary interview)

In situations where she thought failures or mistakes would cause emotional burdens for a student, she endeavored to prevent the students from making such mistakes. For instance, she tried to avoid situations where the “overconfident” student described in section 3.2.1 would have to face his mistakes or failures. Here is one example of a critical incident with another student during a lesson in the student's mother tongue:

Students work in small groups trying to arrange the group members in alphabetical order on the basis of the first letter of their surname. When one group finishes the task, Anne comes to them and asks them to tell her their letters. One of the students remains silent. Eventually, the other students help her [the student] find the right answer. Anne gives the group the next task and moves on to another group. (Critical incident 15)

In the STR interview she reflected on this situation:

It is already January so I would have hoped that she would've said something or even looked at me or anything. ... She is such a lovely girl, but very shy. ... Well, she is surely a very able student, but I usually don't ask her anything unless I really see she is willing to answer; somehow, she has to be so very certain about her answer. (STR interview, Critical incident 15)

This situation apparently continued to bother Anne, and at the end of the week she raised the subject again in the last interview:

I was thinking, maybe in that situation, I could have been more helpful. But, you see, it's not like she would not be able to do it. I know that she is so capable. The only thing is that she would need the courage to say the answer out loud ... in this group of four students she could have had the courage But on the other hand, the other students were so lovely in the situation. (STR interview)

Overall, building students' academic self-esteem as learners through successful experiences was a central feature of Anne's pedagogical thinking. The Finnish national core curriculum likewise emphasizes the importance of this by stating that

experiences of success encourage students to learn more but also to understand that failures and incorrect answers are part of the learning process. They are used in the instruction in a manner that promotes learning and is respectful to the students (Finnish National Agency of Education, 2014, p. 80).

In accordance with the Finnish curriculum, Anne saw the pedagogical power of failure in its ability to develop students' meta-cognition and thinking skills. However, by allowing only those students who do not mind failure to experience it and make mistakes, she missed another important aspect of the pedagogical power of failure, which is to teach the students how to cope with their fear of failure or the negative emotions caused by making mistakes. This is something more than is connoted by the curricular expression of using failure in teaching “in a manner that is respectful to the students.” By comparison with Anne, our teachers with a dominant growth mindset more persistently challenged their students and did not protect them from making mistakes (Rissanen et al., 2018a,b; Ronkainen et al., 2018).

4.2.4. Implementing trait-focused pedagogy for academically competent students

In a manner that is typical of Finnish education and Finnish teachers (Tirri & Kuusisto, 2013), taking care of the weakest students seemed to be a primary concern, one that shaped Anne's pedagogical practice. Anne was less persistent with students she regarded as academically competent. It is worth noting that the three students on whom Anne reflected as having different kinds of emotional and motivational barriers to learning, specifically, lacking courage or persistence, not accepting teacher help, and giving up easily, were also the ones she described as academically competent. Here are some examples:

I have this one student, so very competent, she is outstanding in almost everything, and I don't actually even know what she already knows and is able to do, because she is so shy and guarded and like ... encouraging her does not work at all I have been thinking, like, I will let her to muster up her courage,

and at some point, for she is so smart, at some point she will have the willingness to express it too. (Preliminary interview)

Mm, well, he is like, there is no point in pushing him; he has to be given time. Sometimes the whole lesson goes like ... if something happens already in the morning, an instance where he seizes up, then the whole day can be ruined for him. ... He is academically very competent, but in these types of situations and in different social situations there are problems. (STR interview, Critical incident 23)

It was clear that Anne put considerable trust in the competence stability of the students of whose abilities she had been convinced, which is typical of Finnish teachers (Kärkkäinen & Rätty, 2010). This is something we observed also among our growth mindset teachers (Rissanen et al., 2018a). Anne's strategy for supporting her competent, but anxious students was not to put too much pressure on them in order to avoid defensive reactions and to encourage them to trust their own skills and abilities. She considered it important to give these students time and trusted that their gradual maturation process would lead them to overcome the emotional barriers to learning. Since the students' academic progress was sufficient, she did not regard their occasional lack of effort and persistence as too worrying, and she wanted to be "sensitive". However, the Finnish national core curriculum (Finnish National Agency of Education, 2014) maintains that every student should be helped to reach their fullest potential, which means that prioritizing the needs of those who need extra support for academic progress should be rethought. Furthermore, since the national curriculum strongly emphasizes goals of learning-to-learn in the early grades, academic skills should not be the standard against which a teacher determines which students are in need of extra support. In the data for this study, the three students Anne described as competent appeared to be students who were very much in need of intensive support to learn persistence and how to face challenges.

5. Discussion

In this article, we presented a framework for a growth mindset pedagogy by identifying its core features from our previous case studies, which have examined the implications of teachers' mindsets for their pedagogical thinking and practice. We also presented results from a case study conducted in a Finnish context where the educational system and curriculum are built around principles that accord with process-focused pedagogical thinking, which is the essence of a growth mindset pedagogy. By observing and conducting STR interviews with an experienced mixed-mindset teacher, we were able to investigate whether the teacher's socialization into process-focused pedagogical thinking, as reflected in the Finnish national curriculum and teacher education, enables the actualization of the core features of growth mindset pedagogy in the classroom or whether were critical points at which a teacher's entity beliefs seemed to have an influence on pedagogical decisions.

We found that many core features of growth mindset pedagogy actualized in our teacher, Anne's, classroom: she supported *student's individual learning processes*, promoted *mastery orientation*, and fostered *process-focused thinking* in her students. Furthermore, many features that have been previously associated with teachers' strong dominant fixed mindsets, such as comforting students for their lack of ability (Jonsson & Beach, 2012; Rattan et al., 2012; Rissanen et al., 2018a) were not observed in her pedagogical interactions with the students. However, the clearest difference between Anne and the growth mindset teachers we have previously

observed was in Anne's *lack of persistence* in teaching some of her students. We observed critical instances where the influence of Anne's fixed beliefs concerning students' personalities and academically competent students, as well as her lack of understanding of the mindset phenomenon, became apparent and diminished her persistence. For instance, the first critical point we identified in Anne's practices was that she *did not recognize or actively counter students' fixed mindset behaviors*. She was unable to analyze the reasons behind her students' over-confidence, lack of persistence, or self-handicapping behavior – features typically attached to students' fixed mindsets and their way of avoiding failure, while putting effort into appearing smart and talented (Ehrlinger et al., 2016; Rhodewalt, 1994; Yeager & Dweck, 2012). When a teacher understands these dynamics and is sensitive to students' emotions related to learning and how students themselves justify their successes and failures, she can actively engage in countering their attributions, which can powerfully influence motivation. This is similar to the aims of growth mindset interventions implemented by researchers (Schmidt et al., 2015).

Furthermore, students' motivational frameworks based on a fixed mindset cannot be changed by relying solely on the motivational power of mastery experiences, as was Anne's ideal. She *relied on the motivating power of success* and protected some of her students from challenges instead of teaching them how to cope with mistakes and failures. Research has shown that mastery experiences are an important source for the development of students' academic self-efficacy (Usher & Pajares, 2008). However, mindset studies also question the reasonableness of relying solely on the motivating power of mastery. Experiences of success do not help students cope with future failures; students also need to be taught how to interpret failure and cope with it, and how to understand the importance of effort and not blame their abilities for the difficulties (Dweck, 2000, p. 57).

A third critical point in Anne's pedagogy was how she implemented *trait-focused pedagogy for academically competent students*. This is something we have observed in Finnish teachers who have a strong dominant growth mindset. A lesser likelihood of implementing a growth mindset pedagogy for academically competent students, based on the teacher's conviction of their competence stability (Kärkkäinen & Rätty, 2010; Rissanen et al., 2018a), is an important critical point that is emerging as typical of the Finnish context. Apparently, the smooth academic progress of some students makes teachers regard it as more ethical to prioritize supporting the needs of other, low-achieving students. However, if the high-achieving students' growth mindset is not developed during comprehensive school, where they can still succeed with ease, and if they are not taught to value effort, hard work, set goals on the basis of their current level, and face setbacks, they are at great risk of becoming dropouts from the higher levels of education and never reaching their full potential (Blackwell et al., 2007). A fixed mindset may develop at a very young age in children who are praised for their talents (Mueller & Dweck, 1998). This leads to the children becoming more focused on performance goals than on learning goals, putting their efforts into appearing smart, and avoiding challenges (Dweck & Leggett, 1988; Mangels et al., 2006). Research has shown that high-achievers with fixed mindsets do not cope well with challenges (Blackwell et al., 2007). Furthermore, mindset sometimes predicts academic success better than intelligence (Dweck, 2000, pp. 29–38). However, this understanding of academically competent students as fragile and in need of support has been lacking in the growth mindset teachers we have observed.

The results of the present study support our view that while many of the core features of growth mindset pedagogy accord with state-of-the-art conceptions of "good pedagogy" and are probably already being implemented in research-based teacher education,

teachers' entity beliefs affect their pedagogical thinking, which makes it important to acknowledge develop the implicit belief systems of teachers in teacher education. Furthermore, the critical points we have observed reveal how lack of knowledge about the mindset phenomenon hinders teachers from understanding the sometimes counter-intuitive implications of their own practices or from interpreting student behavior correctly. Thus, space should be made in teacher education courses for research-based knowledge on the effects of students' implicit entity beliefs on their motivational approaches, behaviors, learning, and achievements discussed above.

The framework of a growth mindset pedagogy as presented in this article can be used as a tool to guide observations in future studies. It can also be used as a pedagogical tool in teacher education to steer, for instance, students' self-reflective practice and observation tasks connected to guided teaching practice. The core features of a growth mindset pedagogy we have presented are based on our observations of the practices of teachers who have a dominant growth mindset. However, the core feature of many mindset interventions, which has proven to be successful in developing students' growth mindset-oriented motivational frameworks and helping them cope with failures and challenges, we have not observed in natural settings. This core feature is teaching students about the malleability of the brain and the malleability of qualities, and repeatedly reminding them to think of their brains as muscles that need practice and effort to develop (Schmidt et al., 2015). This is something that should be presented as part of the toolkit of a growth mindset pedagogy in teacher education.

It is important to continue research into how growth mindset pedagogy is actualized at different levels of education and in educational systems, what are its critical points in different contexts, and what are the effects on students. Previous studies have had partly ambiguous results concerning the impact of teachers' mindsets for pedagogical practices and for the development of students' mindsets. In the intervention study by Schmidt et al. (2015), two teachers were observed who had been identified as holding a growth mindset on the basis of Dweck's scale (2000, 2006). Only one of them actualized a growth mindset pedagogy in practice – and only this teacher's students had long-lasting benefits from the mindset intervention in which they had participated. Park, Tsukyama, Gunderson, Levine, and Beilock (2016) conducted a study in which they explored first- and second-grade students' motivational frameworks and mathematics achievements, and found that these were connected to teacher-reported mastery-oriented atmospheres in the classroom, but not very much to the teachers' mindsets. While the reliability of evaluating individual teachers' mindsets on the basis of the mindset scale can be questioned, the results of these studies point up the continuing need for finely nuanced qualitative studies that identify the implications of teachers' implicit belief systems for their pedagogical practices.

Declaration of interests

Authors have no competing interests to declare.

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