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## Epistemic agency in student teachers' engagement with research skills

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### ABSTRACT

In today's knowledge intensive and post-factual world, student teachers' relationship towards knowledge is a vital element in learning to teach. Student teachers must have a sense of epistemic agency to see themselves as productive participants in knowledge-laden activities. However, little attention has been paid to the role of agency in the interconnections between research and teaching in higher education. This study aims to identify how epistemic agency is manifested in student teachers' expressions when they are provided with tools for knowledge production (educational research skills). Epistemic agency was examined as a narrative practice in student teachers' texts ( $N=73$ ), and a data-driven analysis was conducted. The results explore the four dimensions of professional practice towards which the students directed their epistemic agency: 'the self', 'the class', 'the research literature', and 'the everyday life'. The study makes visible the variety of how engagement with research skills can promote epistemic agency.

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Epistemic agency; teaching methods; teacher education; higher education

## Introduction

The world we live in is increasingly knowledge intensive, and professionals are expected to engage in continued learning and knowledge development (Bennett, Dunne, and Carré 1999; Jensen, Lahn, and Nerland 2012). In teacher education, the challenge is urgent to renew the programmes to meet the knowledge requirements of the twenty-first century, including making teacher education systems more research-based (Afdal and Damşa 2018; Afdal and Spernes 2018; Darling-Hammond et al. 2017). However, we lack a thorough understanding and empirical evidence on how research-based teacher education can support student teachers in their professional development. This article addresses this gap by examining how exposure to research skills can support the development of student teachers' epistemic agency, understood as adopting an active and productive stance towards knowledge (Damşa et al. 2010). Research skills can be seen as an important tool for advancing epistemic

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agency since the main objective of research is critical and productive engagement with knowledge. Consequently, this study identifies how student teachers express their epistemic agency through engagement with research skills during their first teaching practice period.

New requirements for understanding knowledge in teacher education arise in the age of post-truth, as factual arguments are held as secondary in relation to emotional ones (Brew and Mantai 2017; Hauke 2019), and personal beliefs can trump expertise and academic values (Hughes 2019). Moreover, teacher education has to redefine its relationship with a world that is faced with complex problems, such as climate change, natural resource shortages, injustices involving, for example, race and gender, socio-economic inequalities and human rights abuses (Chu et al. 2016). To educate citizens who think critically and creatively (Hauke 2019), teachers themselves have to see their role as independent and responsible experts who have control over their knowledge base (Hordern 2019b).

To foster pupils' agency, student teachers must themselves develop a strong sense of agency (Edwards 2017). However, there is an insufficient understanding of the epistemic aspects of supporting agency in teacher education. To be able to create knowledge, the student must see oneself as a productive participant in knowledge-laden activities (Damşa et al. 2010). The concept of epistemic agency provides a lens for increasing the understanding of student teachers' orientation towards knowledge. This is particularly important at a time when knowledge is easily commodified and external actors strive to influence the professionals' work (Hordern 2019a, 2019b). In short, a better understanding of epistemic agency is needed to develop teacher education in a way that is responsive to current and future societies.

This article explores research skills as a tool for developing epistemic agency. In the present study, research skills refer to the concepts, tools and embodied skills needed for understanding how knowledge is produced, maintained and reproduced in our society (e.g. Murtonen and Salmento 2019). Research skills are at the heart of research-based teacher education. The use of research skills involves complex cognitive processes and might be emotionally challenging (Hughes 2019). It also implies taking an active role in knowledge creation, thereby resembling key characteristics of epistemic agency (Damşa et al. 2010).

The Finnish model of emphasising student teachers' own research has aroused interest worldwide (Darling-Hammond et al. 2017; Mikkilä-Erdmann, Warinowski, and Iiskala 2019), and, thereby, provides an interesting context for this study. The class teacher profession is strong and valued in Finland. Class teacher education is one of the most attractive university programmes, and only a small percentage of the applicants are admitted through selection proceedings (Niemi et al. 2018). Relative to other countries, Finnish teachers have a high degree of autonomy in their work. No school inspection system exists in Finland, and a climate of trust in academic teacher education and a high level of expertise among qualified teachers have been established (Mikkilä-Erdmann, Warinowski, and Iiskala 2019). This underlines agency both as a requirement and as a target in teacher education and may create a strong basis for epistemic agency.

The linguistic expressions in student teachers' reflexive teaching practice reports were analysed in a data-driven way after they had studied research skills and put these skills into use in teaching practice in a University teacher training school. A narrative practice approach (de Fina and Georgakopoulou 2008; Riessman 2011) was used to discover the

linguistic nature of epistemic agency (Hilppö et al. 2016) to reveal characteristics which may otherwise remain hidden (Martin 2016). Using a certain kind of language may also create further epistemic agency for students. Thus, the aim of the study is to explore *how is epistemic agency manifested in student teachers' expressions when they engage with research skills.*

## Literature review

### ***Research skills as a key part of research-based higher education***

To date, research skills have mainly been investigated in literature of higher education in general. The development of research-based education can be seen in the light of society becoming more knowledge intensive. Teaching in higher education in general has shifted from teacher-focused approaches to more student-focused pedagogical solutions (Healey 2005). Research as knowledge production does not remain the same over time, either. The boundaries between research and application become blurred when research becomes more context specific and multidisciplinary (Healey 2005).

Examining the principles, motives and practices of research-based education is highly topical in the context of teacher education. The status of teacher education has recently been raised to master level programmes in many countries, and the research base of teacher education programmes has been strengthened throughout Northern Europe, such as in Norway (Afdal and Spernes 2018) and Sweden (Alvunger and Wahlström 2018). Darling-Hammond et al. (2017) explored common characters of high-performative education systems (Finland, Singapore, Shanghai in China, Alberta and Ontario in Canada and New South Wales and Victoria in Australia). They found that in these systems, teaching is considered a research-informed and research-engaged profession, whereby the research-base of teacher education has been developed in multiple ways (Darling-Hammond et al. 2017). In Finland, teacher education has been a master's level degree for decades (Mikkilä-Erdmann, Warinowski, and Iiskala 2019), and learning research skills is a central part of the studies. However, problems in the interconnections between research and teaching have been reported; for example, student teachers may not see research skills' relevance in teachers' work (Puustinen et al. 2018).

One challenge is that the concept of research-based teacher education can be operationalised for different purposes, such as measurable improvements in achievement for pupils or deeper and broader conceptualisations of educational purpose, including the development of individual and collective human virtues or the furthering of social equity and justice (Hordern 2019a). Moreover, efforts to base teacher education on research do not guarantee that the student teachers' research skills are enhanced since, like in any higher education programme, it can sometimes be operationalised by using teacher-focused methods and emphasising the research content instead of the research problems and processes (cf. Healey 2005).

Student-focused approaches in higher education have emphasised students constructing their own knowledge through active participation (Healey 2005). Thus, interactional learning environments in which students are positioned as contributors (Lipponen and Kumpulainen 2011; Virtanen and Tynjälä 2018) and involved in research (Healey 2005) have also been oriented towards developing an inquiring stance among students. At

best, students take ownership of their learning, and research becomes part of their identities (Clark and Hordosy 2019).

Teacher-focused methods in teacher education hold problems in terms of knowledge creation, too. If students are merely taught knowledge created by others (i.e. scholars), the students merely acquire knowledge (Paavola and Hakkarainen 2005) and remain passive towards research (Clark and Hordosy 2019), whereas student teachers could be provided with tools (research skills) to participate in the knowledge creation actively themselves. In the Finnish teacher education model, it has been argued that being active (producing new knowledge while reflecting on one's own work) presupposes studies in research methods. For that reason, the common frame of teacher education curriculum in Finland contains systematic studies of research methods (Kansanen 2014).

The notion of 'research skills' in the context of higher education refers to a collection of concepts, tools and embodied skills that have the potential to mediate student teachers' learning in ways that support agentic engagement with professional knowledge. In higher education in general, research skills have been seen to form an underlying principle (Murdoch-Eaton et al. 2010; Murtonen and Salmento 2019), and the abilities to think critically, analyse and solve problems and make decisions in relation to complex knowledge are required of all professionals (Brew and Mantai 2017; Hauke 2019). Research skills have traditionally been linked to education on natural sciences, technology and engineering, and they have been widely examined in those fields (cf. Seymour et al. 2003; Rand 2016). However, much of the literature on learning and teaching is discipline specific since there are significant differences among disciplines in terms of what academics do and how those activities are described and valued (Healey 2005). Therefore, actors in teacher education have to rethink and create the teaching of research skills in line with the teaching profession.

The existing research points to several advantages of emphasising research skills in teacher education. Firstly, when learning research skills by actively participating in conducting research themselves, student teachers enhance their capacity to think critically and creatively in the teaching profession (Niemi and Nevgi 2014). This is highly topical in terms of teachers' ability to support pupils' twenty-first century skills. Secondly, research skills can also pave the way for the better integration of theory and practice, which has been acknowledged as a crucial challenge in teacher education (cf. Hordern 2019b). This challenge comes close to the literature regarding the interconnections between research and teaching or, in other words, the research/teaching nexus (Clark and Hordosy 2019), the research-teaching relationship (Barnett 2005), or the research-learning relationship (Brew and Boud 1995), highlighting the ways in which knowledge is generated and communicated in higher education (Brew and Boud 1995).

Thirdly, research skills studies are a key component in introducing and developing research-based teacher education across Western Europe (cf. Afdal and Spernes 2018; Tatto 2015). However, it is not guaranteed that every student will learn to adopt research skills and be able to transfer the skills to other parts of one's life. Some researchers of higher education have expressed the doubt that only high-performing students can make use of research skills in their profession, as some students can remain unclear about the purposes of these studies (Hughes 2019). Moreover, certain constraints, such as higher education students' disinterest in research and an experienced distance between the students and researchers, can prevent the natural orientation towards knowledge creation (Clark and Hordosy 2019).

Research must be understood in relation to the other skills taught in higher education. Recently, Murtonen and Salmento (2019) identified research skills in higher education under the broad umbrella of scientific thinking, including critical thinking, basic scientific understanding, epistemic maturity, evidence-based reasoning skills and contextual understanding. Research skills have also sometimes been referred to as twenty-first century skills (Niemi and Nevgi 2014), understood as the skills that are essential for navigating the demands of the twenty-first century and addressing the manipulation and use of information (Griffin, Care, and McGaw 2014). The standards of twenty-first century skills have demanded research-oriented approaches to learning without explicitly saying so (Chu et al. 2016). Furthermore, they obviously have links to core skills, which can also be described as key, generic, personal transferable, common and work or employment skills (Bennett, Dunne, and Carré 1999). However, research skills seem to have an independent role as tools in creating new knowledge (Murtonen and Salmento 2019), which is crucial as students are supposed to evolve to become agentic professionals, autonomously and actively utilising gained knowledge and skills in their work.

In summary, the existing research reveals that research skills should be a vital part of modern teacher education. However, few empirical studies on research skills in teacher education have been conducted (Damşa 2018; Eklund 2018; Niemi and Nevgi 2014). This article contributes to this gap by revealing how student teachers express their epistemic agency in the context in which they practice teaching after they have been provided with research skills.

### *Epistemic agency in higher education*

In the following, agency and especially epistemic agency in the context of higher education are discussed. Agency in general is present in educational activities, where opportunities for active participation and intentional membership are found to be important (Lipponen and Kumpulainen 2011; Kajamaa and Kumpulainen 2019). Agency can be seen as a focus itself (Lipponen and Kumpulainen 2011) and as a means to gain expertise in teaching (cf. Toom, Pyhältö, and O'Connell Rust 2015) or as a way to achieve some other capability where routine performance is not enough (Rajala, Martin, and Kumpulainen 2016). From a socio-cultural perspective, it has also been emphasised that agency is not achieved in a vacuum, but always manifests itself in relation to a given context (Edwards 2017; Rajala et al. 2016). It is also personally constructed through many forms of interactions within that context (Oolbakkink-Marchand et al. 2017) and is entangled with reflexivity, or the capacity to monitor and evaluate one's actions and structural contexts (Pantić 2017).

The reflexivity dimension of agency comes close to the concept of epistemic agency, which can provide a fresh way to support student teachers in developing their expertise, since knowledge increasingly defines our activity (Paavola and Hakkarainen 2005). Epistemic refers to knowledge and knowing. It is connected to the way knowledge is understood and to questions about who the subject of learning is, what kind of knowledge should be learned and how the learning should occur (Paavola and Hakkarainen 2005). Epistemic agency highlights the capacity that enables people to be responsible for their own knowledge advancement (Damşa et al. 2010). It has been defined as the personal management of learning resources in the generation and development of knowledge (Smith 2017). It can be seen as twofold, consisting of knowledge-related actions, such as collecting information and sharing ideas and knowledge, and process-related actions,

such as setting goals and monitoring the progress of activities (Damşa et al. 2010; Maclellan 2017). This does not imply that the knowledge that people create is new to the world, but new knowledge should be understood in its context – the knowledge created by people is new to them (Damşa et al. 2010).

In recent literature of teacher education, it has been acknowledged that to be able to educate capable teachers, one must pay attention to whether student teachers experience agency in their studies. Researchers have documented that fostering agency in teacher education, for example in Finland (Juutilainen, Metsäpelto, and Poikkeus 2018; Soini et al. 2015), the Netherlands (Oosterhoff, Oenema-Mostert, and Minnaert 2020), Norway (Brevik et al. 2019), and UK (Pantić 2017), has been beneficial in supporting teacher learning. However, the epistemic aspect remains scarcely studied although one's relationship towards knowledge is a vital element in learning to teach (Hordern 2019b). This study contributes to this gap by explicitly concentrating on student teachers' epistemic agency.

### Theoretical perspectives of this study

This study takes as a point of departure the assumption that engagement with research skills can provide a valuable entry point for developing students' epistemic agency. Drawing inspiration from the work of Damşa et al. (2010), epistemic agency is understood as adopting an active and productive stance towards knowledge, through which student teachers generate knowledge and insights that are new to them. Epistemic agency is important because a defining characteristic of teachers' work is to be able to simultaneously draw upon multiple knowledge sources to support practical action (Toom and Husu 2018). Additionally, teachers need to be able to combine and develop knowledge in creative ways to deal with the unpredictable nature of life in schools. Teaching requires continuous adaptation to emergent processes and the exercise of professional judgment tailored to the specific characteristics of the situation (Biesta 2007). Finally, epistemic agency is important as teachers' collective autonomy is increasingly linked to the capacity to safeguard and develop the profession's knowledge base (Hermansen 2017).

Rather than viewing teacher education as an arena where student teachers individually 'accumulate' knowledge, professional learning is viewed as a process of increasing students' ability to work with scientific concepts and tools in ways that enable them to support children's learning in schools and develop their communities (Edwards 2017). The complexity of professional work means that teachers cannot only respond to problems of practice on the basis of prior knowledge. Instead, professional responsibility 'extends to recognising epistemic dilemmas and the demands they present and responding agentically to them in order to bring fresh knowledge to bear and produce new knowledge that can enrich the epistemic basis for action' (Hopwood 2017, 122). The emphasis on the generation of knowledge to sustain professional judgment and action implies that student teachers must 'be more than mere knowledge 'carriers' but [...] be productive participants' (Damşa et al. 2010, 146). In the context of teacher education, student teachers can be supported to become agentic and productive by working with scientific knowledge and tools that strengthen their opportunities for creative engagement with professional knowledge. More specifically, this study focuses on how students express their using of concepts and tools labelled as 'research skills' to develop their understanding of professional practice in the context of a school-based teaching practice.

Hence, a fundamental premise of research-based teacher education is that research skills support student teachers in seeing and interpreting their lived experience in schools in ways that would otherwise not be accessible to them (Hughes 2019). Research skills therefore provide an interesting empirical entry point for examining the development of epistemic agency in teacher education. In our empirical analysis, the analytical focus was placed on how specific research skills helped the students express their epistemic agency, allowing them to move forward with their overall objective of becoming professionals who support pupils' learning and well-being.

## Research context

This study presents an examination of student teachers' accounts in one Finnish university, which is one of eight Finnish universities offering teacher education. The University can be described as multidisciplinary and is relatively large by Finnish standards. Upon completion, the students will have the qualification to teach grades 1–6 (ages 7–13 years) in comprehensive school. First-year student teachers were chosen since the beginning of studies is an epochal and fragile phase (Juutilainen, Metsäpelto, and Poikkeus 2018; Soini et al. 2015) in terms of developing their orientation towards knowledge and knowing in their future work.

In Finland, class teacher education is a five-year academic study programme leading to a master's degree. In this University's teacher education programme, research skills studies and teaching practice are parallel, beginning in the first term. According to the curriculum (University of Turku 2019) in research skills studies, the students rehearse research methods, such as observations and interviews, with the idea of using multiple methods and case studies as background approaches. They also study information seeking, studying strategies, information literacy, research ethics, data analysis methods and scientific writing, and they practice having scientific discussions and working in a group (University of Turku 2019). In teaching practice, which takes place in University training schools, the students are assumed to show agency and apply theoretical knowledge to practice, especially by adopting a rich array of didactics with research-based groundings.

In this programme, research skills studies and teaching practice, which are separate study modules, are integrated in such a way that students carry out research in small groups during teaching practice. Research skills instruction takes place in the Faculty of Education building and is facilitated by teacher educators who also act as researchers, whereas teaching practice is held in the University training school and is guided by training school teachers, whose main role is to support the practice of teaching. After teaching practice, the students write a report in which they are instructed to reflect, amongst other things, on conducting research. This creates a fruitful way to examine in a practical context the ways in which (if any) epistemic agency is manifested.

## Method

### *Data collection*

Written texts from first-year student class teachers were retrieved from their teaching practice reports in the autumn of 2018 from the said University (cf. chapter above).



The analysis consisted of 73 reports, which were 90% of the reports of the students enrolled in this teaching practice. Of those students, 44 were female, and 29 were male. The age of the students varied between 19 and 55 years. However, most of the students were in their early 20s. The students were asked to explain whether they gave their permission for their report to be used for research purposes. However, they did not know the exact topic of the research, which means that the research topic did not influence their answers. A total of 81 students were enrolled in teaching practice, of which 73 students gave their permission, one did not answer the question on permissions, five did not give permission and two did not return the report.

In conducting the study, the ethical principles of research with human participants and ethical review in the human sciences in Finland, published by the Finnish National Board on Research Integrity TENK (TENK 2019), were complied with. According to these guidelines, a formal ethical review statement from a human sciences ethics committee was not required in this kind of study. In the article, pseudonyms are used.

In their reports, the students answered the following questions concerning research skills: ‘What kind of conceptions did you have on research skills before entering teacher education? Why? What was it like to conduct research during the teaching practice and what kind of thoughts did it arouse in you? What kind of insights did you have and what kind of conclusions did you draw on teachers’ work/the teaching profession during teaching practice? How do you think these research skills that you practice will be realised in your future work as a teacher?’ Pedagogical approaches that encourage reflection in the research curriculum can help students to articulate their researcher identity and build their research skills confidence (Hosein and Rao 2017). Therefore they also serve as appropriate data for exploring epistemic agency via engagement with research skills.

Research skills were only one part of the report; only this part of the report was used since the other parts concerned other features of teaching practice such as their teaching and interaction with the pupils written in practical classroom language and not relating to research skills (for example the atmosphere of the class or classroom management). That is why these parts were not used and analysed. The length of the parts used varied between approximately 100 and 300 words.

### **Data analysis**

The data were analysed using a narrative approach since the idea was to concentrate on how epistemic agency manifests itself at the level of language (cf. Eteläpelto et al. 2013). The role of the linguistic expressions was seen as important since how people speak reveals, creates and restricts the possibilities of epistemic agency. An emphasis was put on atypical small stories, with a functional perspective on narrative and language use in general (Bamberg and Georgakopoulou 2008), in line with the theoretical body of narrative practice (de Fina and Georgakopoulou 2008; Riessman 2011). In the previous literature, agency has been traced in empirical material as language that implies responsibility (for example pronouns, tense, verbs or sentence structure) (Martin 2016) or the modalities used in narrative semiotics (for example to want, know, be able, have to, know, feel, experience, appreciate and have the possibility) (Hilppö et al. 2016).

Before the main analysis, an overall view of the narration in the parts concerning research skills was taken. Here, the data were handled as a whole entity to grasp a wider picture of what the students were telling, as a whole, when answering the stated questions, how they told it and why (cf. Hyvärinen 2008). Based on these preliminary readings of the data, we began reading the texts as individual stories of knowledge creation and as using research skills in the teaching profession. In their texts on the use of research skills, the students directed their epistemic agency towards different dimensions of their professional practice. These dimensions can be summarised as, first, the self; second, the class; third, the research literature; and, fourth, everyday life. The presentation of the findings was organised according to these dimensions. In each text, the dimensions that were present were marked.

After that, all the parts clearly illustrating some of the dimensions (one or several) were transferred to another document, where those parts could be examined in depth. The parts with no clear link to knowledge or research skills and those parts containing only declaratory statements with no narrative or personal input were not transferred. Some of the parts pointed to two or even three dimensions. For the sake of clarity, these were transferred to the most suitable dimension; thus, in other words, the categories were treated as mutually exclusive for analytical purposes. The dimension of the self and the dimension of the class were the largest ones with 21 (the self) and 22 (the class) excerpts. The dimension of research literature had 11 excerpts. The dimension of everyday life had only four excerpts, but the excerpts were rich in nature.

After having created this analysis document, a closer look at epistemic agency in each dimension was taken, and the narrative nature of the parts were analysed more thoroughly (i.e. how the matters in question were expressed). In the narration, special notes were taken on repetitions, hedges, negatives, contrastives, evaluative language and evaluative verbs (Hyvärinen 2008; Tannen 1993). Epistemic agency was found to be rich, especially in the verbs the students used, and they were analysed thoroughly. However, all the parts did not contain features that could be identified as manifesting epistemic agency, although most of them did.

## Results

In the following, the four dimensions are first depicted at a general level. Secondly, all dimensions – the self, the class, the research literature and the everyday life – are addressed separately. The categories represent the different dimensions of professional practice towards which the students directed their epistemic agency. The data illustrated a two-way dynamic in the students' engagement with these dimensions. First, the students used research skills to acquire new information and to develop in-depth knowledge about these areas. Second, research skills were seen as helpful in creating new knowledge based on the information the students had acquired.

The students combined knowledge from these different dimensions to create new knowledge that could inform their teaching practices. Knowledge relating to these categories was seen as dynamic and in need of interpretation, modification and personal input and treated as a point of departure for knowledge creation with the community of teachers. In some texts, epistemic agency could not be identified. However, the point here is to describe what kind of epistemic agency is possible to support through the use

of research skills, rather than concentrating on individual students' abilities or capacities. The categories are presented in [Table 1](#).

In the following, the four dimensions are presented and the linguistic signs of expectations (cf. chapter Method, Tannen 1993) are marked in bold font.

### The self

The self can be deemed as the most important dimension. On the one hand, it is a separate dimension, but on the other hand, the students related all the other dimensions to the development of their professional self-understanding and identity, since teaching always involves the teacher's self. Most of the parts belonging to this dimension covered the self in the teaching profession. However, some of them did not discuss teaching, but rather generic skills. This can be seen as a nuance of epistemic agency, too, since the students adopt skills that they can use broadly in their personal lives, not only in the teaching profession. The main way to exercise one's epistemic agency towards this dimension was to develop oneself and one's thinking and evaluate one's teaching, being critical and modifying and applying knowledge. In the following excerpt, the dimension of the self is linked to being responsible for the pupils:

*In order to be **responsible** for future generations **we have to know what we do, how we do, when we do and why we do like we do**. Research is the **core** of all this. As a teacher, it is **extremely important** to develop oneself and one's own thinking.* (Anna)

In the following [Table 2](#)., we demonstrate how the analysis was conducted by cutting the excerpt into smaller pieces.

In the following excerpt, a little similar, moral aspect is expressed:

*When **I** understood to combine educational theory and related terms to the life of the class, **I** understood **better** the significance of our own research. In the future, **I know I will** be using research, namely **at least** to interpret my own work and pupils' behaviour. A research-like approach also **requires constant** seeking of new information, and so **I want** to seek new information and develop my own work in the future, **too**.* (Brita)

In the above excerpt, the student expresses a strong will and mission for knowledge creation in teacher's work: 'I know I will' and 'I want'. Moreover, the student speaks twice about understanding, which implies new realisations. The student speaks mainly about her teaching, but it is intertwined with the dimension of the class. Thus, this is an example where two categories are present but the dimension of the self is more dominant. On the basis of the analysis, the research skills' role in epistemic agency relates to, on the one hand, being responsible for justifying and questioning one's action and decisions as a teacher, and, on the other hand, having mental fluidity for professional learning.

**Table 1.** Dimensions to draw information from and to create knowledge through research skills.

Name of the dimension	Description	Number of excerpts
The self	Own teaching and oneself in general	21
The class	The pupils of the classroom, their families, cultures and backgrounds	22
The research literature	The existing research on learning, teaching and education	11
The everyday life	Phenomena, facts, etc.	4

**Table 2.** Narrative practice analysis of Anna's excerpt.

Anna's text	Analysis
'In order to be <b>responsible</b> for future generations'	Anna states a premise for her action.
' <b>we have to</b> know'	She states a moral necessity, which is also collective in nature. A verb concerning epistemology in teaching
' <b>how we do, when we do and why we do like we do</b> '	Several questions and a lot of repetition, which implies that nothing seems to be fixed or taken for granted, but reflection via research skills is required. Of interest is also the collective way of speaking, as she uses the expression 'we', indicating a collective notion of agency and autonomy (Hermansen 2017).
'Research is the <b>core</b> of all this'	A strong metaphor for research ('core') 'All' is used as emphasis.
'As a teacher'	She goes back to emphasise that she is talking about the profession.
'it is <b>extremely important</b> to develop oneself and one's own thinking'	Highlighting the importance Again, stating the premise, which is to develop oneself, and epistemologically, one's thinking as a teacher. Two premises imply repetition.

### The class

When writing about the class, the students spoke about the importance of knowing the pupils in the classroom, their families, cultures and backgrounds to teach effectively. They depicted how, through the use of research skills, they could find out and notice more about these dimensions of their practice. Research skills were present in every moment, as it was necessary to observe the pupils and their learning all the time. Thus, the students exercised their epistemic agency towards this dimension mainly by observing, sensing and acknowledging things from different points of view. It was seen as important to develop knowledge by listening to the pupils to be able to support their learning and well-being. The students' epistemic agency was most visible when the students questioned their first-hand impressions about the pupils and argued about interpretations, as in the following excerpt:

*When conducting research, I realised that a teacher does in his/her work research-like things all the time. You have to interpret and read pupils and, also, understand where the pupil's actions and reactions derive from.* (Claus)

In the excerpt above, the student uses three different verbs to emphasise and illustrate that, as a teacher, it is not possible to count on one's own first-hand conceptions about the pupils, but it is necessary to 'interpret', 'read' and 'understand'. The student seems to have attained this realisation by conducting research; thus, research skills are seen as a tool to do this interpretation. He also uses the evaluative expression 'all the time' in emphasising the ever-present nature of research skills. Overall, the dimension of the class shows a different purpose of research skills than the dimension of the self. In the dimension of the class, the research skills' role concerns observing the empirical reality, monitoring actions and reactions in the classroom, and seeing the pupils' matters from different points of view.

### The research literature

The research literature dimension was not as dominant as the two previously mentioned dimensions, but it was clearly present. As with the class, the research literature dimension was also understood as requiring interpretation. The students argued that educational literature could not be assumed as such, but needed a critical, agentic and applied approach.

As a teacher, one should also modify the knowledge drawn from the research literature to one's own purposes to be helpful in one's teaching. Thus, the students used their epistemic agency towards this dimension by interpreting, modifying, being critical and working with concepts. The students did not seem to think that research literature was something they should read passively, but something that is and should be applicable, as in the following excerpt:

*Research skills are visible in reading research literature and, overall, understanding it. I also understand that I have to evaluate the validity of the studies critically from different aspects (technical problems, problems specifically in examining children, etc.) I also know how I can seek valid information and where I can find it. (Ella)*

The dimension of the research literature shows an aspect of research skills' purpose, which closely relates to the post-factual times. They use research skills for interpreting educational knowledge and assessing its validity, which provides them with new lenses for their work as they assume and apply theoretical, abstract knowledge and concepts.

### **The everyday life**

This dimension was not frequently referred to, but was still recognisable as a pattern in the students' texts. Everyday life referred to several things, such as phenomena and facts, or anything a teacher has to be aware of. It points to the teacher's need to be updated of current matters going on (for example in society). In this context, the students exercised their epistemic agency by examining the validity of different knowledge sources and seeking out and evaluating new information. In the following excerpt, the dimension of the everyday life is used as providing a contrast to the school:

*I realised how much this profession is about constant information seeking, examining and processing – I understood how important it is to support the strengthening of the pupil's own voice and development of thinking. I also understood better how much work is required to create a natural link and thinking connection between school's everyday reality and the outside world. (Isak)*

At the end of this excerpt, the student expresses the need to create a link between school and everyday reality for the pupils. This should be seen in connection to the aforesaid: the work requires information seeking, examining and processing. It seems as though the student emphasises drawing on many dimensions, especially the general dimension of the everyday world to integrate formal teaching and 'the life outside the school'. It is also visible how the student expresses new insights about this: 'I realised', 'I understand' and 'how much'. The dimension of the everyday life has features similar to the dimension of the class. However, in this dimension, the teacher's role in transmitting knowledge is emphasised. Research skills are also seen as bridging the gap between theory and practice in teachers' work.

### **Discussion and conclusions**

This study has revealed how epistemic agency (Damşa et al. 2010) is manifested in student teachers' texts when they engage with research skills in their school-based teaching practice. The data illustrates how expressions of epistemic agency are related to the research

skills that students have encountered in the teacher education programme. Epistemic agency is visible in four dimensions of professional practice. All the dimensions reveal a distinct way of exercising epistemic agency through research skills. First, the dimension of the self was relevant in terms of the students' own professional development. Research skills served as a tool for questioning oneself. Second, in the dimension of the class, epistemic agency was aimed outwards, towards what happened in the classroom and the characteristics of the children. Here, research skills related to systematic observation and analysis. Third, the research literature dimension emphasised the significance of critically relating oneself to existing research-based information. Research skills were used for interpreting educational knowledge and assessing its validity. Fourth, the dimension of everyday life highlighted the students' needs to see the teachers' work in a larger context. Research skills were used to support in knowledge transmission and making connections between school learning and life outside of schools.

Although some students mentioned two or even three dimensions, most seemed to focus on only one. We maintain that the epistemic agency gained through all four dimensions could be made visible for the students and therefore has great potential that has not been attained in teacher education. Epistemic agency can be fostered through the use of research skills to develop student teachers' professional growth when becoming a teacher, which is a practical profession. Thereby it is possible to avoid the students missing the relevance of studying research skills (cf. Puustinen et al. 2018). Thus, this study has implications for teacher educators as well as student teachers. However, concentrating on one or two dimensions can also signify epistemic agency since the students chose an approach that was best suitable for their needs. Epistemic agency was exercised towards the four dimensions that were discerned and not, for example, on minor matters or issues beyond teaching or professional development.

Healey (2005) pointed out some discipline-specific characteristics in designing inquiry-based programmes in higher education. Teacher education in Finland is based on the educational sciences as the major. In the dimension of the self, the students mostly reflected on the teaching profession. In more generic programmes, the texts might seem quite different. Moreover, the dimension of the class is very much related to the teaching profession. Educational sciences' role as an applied science is visible in the research literature dimension. The students expected to apply research literature for their own purposes in the teaching profession, and they perhaps expected high applicability in their studies. Also, the context is visible in the fourth dimension on inquiring about everyday life for the pupils. The context specificity of the dimensions points to the need to establish research-based activities in teacher education in its own right and make their significance visible for both teacher educators and student teachers.

This study highlights how epistemic agency is tied to language. Questions, repetition, evaluative language and other evidence of expectations (Tannen 1993) show the interconnectedness of agency and general societal expectations since agency becomes visible in the use of language. At the same time, the ways of using language also mediate further agency, as language has the power to create. Theorisations of the narrative nature of epistemic agency deserve more attention to discover the multifaceted and dynamic aspects of students' experiences with research (cf. Clark and Hordosy 2019).

Teachers' epistemic agency is crucial in fostering pupils' epistemic agency in the post-truth world. However, is this aspect present enough in the prevailing teacher education

programmes? Moreover, in which ways does the teaching of research skills activate or passivate student teachers? There is always a risk that teacher training produces robot-like, passive thinkers (cf. Aoun 2017), which is alarming in the knowledge-intensive society (Afdal and Damşa 2018).

The present study holds some limitations. Text data provides more of a flash of situationally positioned insight than a permanent description of student teachers' professional agency (cf. also Hilppö et al. 2016). However, text data are also beneficial, as external elements, such as an interviewer, cannot influence the students too much. Another limitation of the data is its reliance on the students' texts, which prevents knowing, for certain, whether the students revealed their true thoughts in the reports or not – perhaps answering the questions based on what they thought the people reading the reports (especially the teacher educators) would want to hear them say. However, the students' performance was not assessed, which diminishes the significance of this limitation. A third limitation is that there can exist a mismatch between what students teachers say and what they actually do (Kane, Sandretto, and Heath 2002). Linguistic data mixed with observations in teaching practice could provide richer data for making claims about student teachers learning.

In their longitudinal study of how higher education students received and understood research during their studies, Clark and Hordosy (2019) discussed ownership. At its best, research became a vehicle through which students could begin to develop their own interests and needs, and they internalised research as a practice to become something that they did themselves for their own academic and everyday purposes (Clark and Hordosy 2019). The current study has identified how epistemic agency is manifested in teacher education when students are provided tools, research skills in this case. If they are not provided with these tools or they do not adopt them, the risk is that student teachers will go through teacher education without gaining significant epistemic agency. This is increasingly pivotal in times when expert knowledge is threatened (Hauke 2019; Hughes 2019). The discussions of the research/teaching nexus require more insights and empirical research on how to foster epistemic agency via the engagement of research skills.

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