Research approaches in master-based teacher education preparing student teachers for professional work

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Student teachers have been found to be critical toward the research approaches they learned from their master's-based teacher education programmes. Our aim is to discuss how certain research approaches learnt during a 5-year academic master's level teacher education, may bring student teachers close to practice and provide them with conceptual and practical tools for a thorough understanding of the practice of teaching. The argumentation is based on an elaboration of master's-based teacher education programs in Finland and Norway and the essential characteristics of teachers' work. We elaborate on student teachers' need to understand constative, critical and constructive research approaches. This includes critical approaches such as observations and interviews for understanding and interpretation, and constructive approaches such as action research and lesson studies. Finally, we argue that, through these approaches, student teachers make use of research knowledge in teachers' work with an inquiring orientation as well as develop and change their practice.

KEYWORDS

research-based teacher education, master's-based teacher education, research, observation, interviews, action research, primary and secondary school

1 Introduction

International educational trends, students' outcomes and the traditional tension between academic knowledge and practice in initial teacher education have resulted in research for better solutions and continuous development of teacher education (Cochran-Smith et al., 2015; Darling-Hammond, 2017). In addressing this tension, it has been an internationally shift toward more school-based teacher education. In some countries, this shift has even resulted in apprentice-style teacher education programs, while others has opted for an increase in field experience and partnership models (Czerniawski et al., 2023). Finland introduced a 5-year master's-based education programme in 1971 with the ambition of developing teachers with an inquiry-oriented attitude and the capacity to observe, analyse and develop their teaching (Aspfors and Eklund, 2017). The concept of master's-based teacher education involves student teachers learning about versatile research of teaching and learning, and research methods,

and undertaking research themselves, meaning bachelor and master's theses (Aspfors and Eklund, 2017). The report from the British Education Research Association (BERA) claims that implementing master's-based teacher education programmes would improve countries' education systems (Furlong et al., 2014). Norway introduced a 5-year master's-based primary and secondary school teacher education programme in 2017 to improve academic quality in schools through a focus on deep subject knowledge, research and professional development (Jakhelln et al., 2019; Advisory Panel for Teacher Education, 2020).

The new Norwegian teacher education programs inspire us as a group of teacher educators from Norway and Finland to write this article. Recent investigations revealed that several student teachers were critical of the research approaches they learned and the estimated value of writing a master's thesis for their professional work (Olsen et al., 2022; Bakken and Langørgen, 2024). In addition, Finnish student teachers have reported challenges with transforming their research knowledge learned from their master's-based teacher education programme directly into their day-to-day work (Aspfors and Eklund, 2017; Eklund, 2019), claiming they miss practical tools to solve teachers work (Eklund, 2018). The transfer problem may be related to the extensively identified research-practice gap in teacher education, and thus, concretely the types of research approaches student teachers learn through their master's-based program as discussed by Hansén et al. (2012). As such, an essential question is what type of research approach is significant for the practice of teaching and for education, and how it is enacted to teachers work in teacher education programmes (Smith, 2015). In this context, Eklund et al. (2019) found that the concepts of inquiry and research are not clearly defined in the literature on what we describe as master's-based teacher education. Heikkilä et al. (2020) claim that it is possible to integrate academic research and practice, while, Jenset et al. (2018) go further and emphasize that student teachers' learning need to be firmly "grounded in practice," and that the two arenas for teacher education, campus and school, need to be connected. This would orient the student teachers to study and develop their own work, rather than studying schools and teachers as objects. If the student teachers see the relevance of the why and how of research approaches in the education programme, this will add meaning and motivation for their learning.

Our aim is to discuss how certain research approaches may bring student teachers close to practice and provide them with conceptual and practical tools for a thorough understanding of the practice of teaching, as required by an international panel of experts that gave advice to Norwegian authorities regarding the implementation of the new master-based teaching education (Advisory Panel for Teacher Education, 2020). The panel describes the reform as ambitious. Successful implementation requires collaboration among stakeholders and the enhancement of practice orientation in school experiences and master's theses. Close to practice, we relate to student teachers' ability to tackle various aspects of teachers' practical work. However, being prepared for practice is also being prepared to give reasons for choices, as there always will be alternatives to consider, and that teachers need to be trained to assess these alternatives against each other. The intention is also to prepare student teachers with research approaches to investigate and analyse practice in schools, with an

intention to develop them (Aspfors and Eklund, 2017). However, in this paper we will limit ourselves, and not go into the details or aspects of the necessity of content knowledge, general didactics, the role of the teacher and capabilities in teachers' work and teacher education programmes, nor will we elaborate on inclusive education and using new technologies in teacher education. From this background, we elaborate on the following research questions: How may research approaches in teacher education in the form of observations, interviews, action research and lesson studies prepare students for their professional work?

The paper is structured as follows: first, we describe the context of the Finnish and Norwegian master's-based teacher education. Next, we elaborate on the essential characteristics of teachers' work and teaching, and then discuss research approaches in research-based teacher education programmes. We argue for student teachers to undertake critical approaches with observation and interviews related to teachers work for understanding and interpretation. We elaborate on the need for constructive approaches through action research and lesson studies in teachers' work, before summing up in our concluding discussion.

2 The Finnish and Norwegian master's-based teacher education programmes

The context of the Finnish and Norwegian master's-based teacher education programmes for primary and secondary schools is the background for our research question. The master's-based teacher education programmes in Finland and Norway are enacted in an academic university environment, are relatively extensive, and include a spectrum of theoretical and practical elements (Jenset et al., 2018). Research is integrated in a variety of ways: as curricula content, use of teaching and learning methods that have been shown to be effective for student teachers' learning (Jakhelln et al., 2019; Cao et al., 2023), learning of research approaches and doing research and, most importantly, cultivating inquiring orientation toward teachers' work (Toom et al., 2010). These programmes tend to have a strong emphasis on cultivating pedagogical thinking and a reflective approach toward teaching, and systematically linking theoretical and practical aspects of teaching (Hansén et al., 2012).

The Finnish model involves a broad knowledge base in several subjects and the teacher education programme's curriculum is intended to prepare teachers with skills to differentiate support and instruction by using different content strategies (Darling-Hammond, 2017). In this respect, research results and evidence are used in the continuous development of the master's-based teacher education programme (Toom and Pyhältö, 2020).

The new Norwegian master-based teacher education for primary and secondary school involves student teachers acquiring a specialized knowledge base, with two to four school-related subjects, with 30–60 ECTS in each. These courses in school subjects include both subject matter knowledge and subject-related teacher knowledge or didactics and involves reading and discussing research. Furthermore, the students are to acquire pedagogical knowledge about, for example general didactics, the role of the

teacher, inclusive education, and collaboration for professional and school development.

The master's thesis in Norway gives in addition a total of 30 ECTS and in Finland 35 ECTS. These theses can be written based on data collection regarding different education studies or subject didactics (Jakhelln et al., 2019). A study of 236 master's theses completed under two piloted teacher education programmes at University of Tromsø, Norway (UiT): Sæther et al. (2024) found that the methods used are dominated by interviews (82% use interviews; 42% as the only method and 40% combined with other methods), mainly of teachers. The other major method is observation (31%, mostly combined with other methods), while methods such as text analysis (19%), action research (14%) and questionnaires (10%) were less frequent. Similar findings are seen in Finland, where 66% of master's theses are based on interview studies (Eklund, 2019). This entails that most use of these research approaches is traditionally academic involving study schools and teachers as objects, even though they should be relevant for teachers' work. Studying others' practices as objects may make it difficult to apply this research knowledge in their own work later. Also, some Norwegian teachers report being bored of constantly being interviewed (Engelsen et al., 2024). It's important to stress that the methods used in the master's thesis are just one part of the methods students encounter during the program.

3 Characteristics of teachers' work and teaching for teacher education programmes

An important point for discussing research approaches in master—based teacher education and the ways in which teachers should be educated are the characteristics of teacher's work and teaching. Teachers' work involves artistry that is performed in the moment, and to achieve such mastery of teaching skills, you need to have practiced real classroom situations over time (Eisner, 2002). Teaching is a non-technical endeavor (Flores, 2020). However, to make in-flight decisions one also needs to make independent judgements and have ideas about alternatives (Van Manen, 1991). Teachers need to take account of the context of all pupils all together, and consider pupils both collectively and individually in educational decisions (Eisner, 2002). Teaching needs what Herbart (Van Manen, 1991) describes as pedagogical tact, which is situational judgement connecting general theory and insights with the unique case and context. Here, tact is realized in the immediacy of practice and is related to the skill and artistry of teaching.

Further, teachers' professional work includes teaching pupils with different needs (Ryan et al., 2022), curriculum work, collaboration with colleagues, collaboration with parents and guardians, and school development, and teachers need knowledge and capabilities for these duties (Toom, 2017). Even so, the teacher's work is demanding in continuously changing social interactions (Lampert, 1998). Considering the complexity of teaching, it is not sufficient for student teachers to develop fixed skills (Flores, 2020; Smith, 2021), or to give student teachers firm and simple answers about their work, but rather to provide them with a variety of resources with which they use to improve their practice of teaching

(Biesta, 2022). Although education and teaching are considered and planned activities, there will always be an element of improvisation (Lampert, 1998). Cochran-Smith et al. (2009) describe it as a hallmark of the professional teacher to be knowledgeable about content and pedagogy, and to learn from teaching on an ongoing basis. One consequence is that student teachers need to be able to develop and analyse their classroom practice in school.

The teaching profession entails continuous learning and development as teachers' work also seem to increase in complexity (Lundahl, 2016). Becoming a professional encompasses not only classroom teaching but also participation in a professional community and contributing to the development of the school (Hargreaves, 2019). In Norway, for example, teachers face substantial expectations regarding research and development work (Ulvik and Smith, 2019). For student teachers, acquiring such knowledge requires participating in deep-level collaboration that Vangrieken and Kyndt (2020) claim to involve reflective autonomy in the form of participating in open and constructive dialogues that question the didactics of teaching, as well as the handling of day-to-day work. In line with this position, research-based teacher education should promote teachers with research approaches, so they become critical and development oriented, to facilitate their own and the school's professional development.

4 Research literacy and constative, critical and constructive research approaches

The student teachers' research approaches in a research-based teacher education programme are intended to support learning to analyse and improve teaching and learning, or their practice in schools. Research results always require a translation effort where teachers must interpret and assess research results in the light of their own context (Hermansen and Mausethagen, 2023). Furlong et al. (2014) introduces the concept of *research literate teachers* that involves knowing different research approaches and research methods, having a critical mindset, being updated on research findings, and understanding their implications for practice. Research literacy gives a wide understanding and will involve knowledge of the close relationship between research design, theoretical framework, research questions and results (Tatto, 2021). Such literacy is intended to be developed through the 5-year master's programmes, with the work on the master's thesis as one of the main elements. While *research literacy* can be seen as a basis for understanding different research approaches. Here, how teacher education is to link research approaches directly with practice provides an important grounding for the development of research-literate teachers. It is essential that during their teacher education, student teachers learn research approaches with which they analyse and understand the practice of their teaching more thoroughly, develop their practical work, and learn and develop as teachers, in line with arguments from Eriksen (2022). Here, Kalleberg (2009) understanding of social science research approaches as constative, critical and constructive, based on the intention of the research questions, would give us a basis for how this may be done.

The purpose of *constative research* approaches is to answer research questions aiming to understand causal effects and obtain causally clear answers about what to do (Kalleberg, 2009), or what Biesta (2015) describes as the "technological term." Examples of such educational research approaches are, for example, Hattie (2008), who undertook a meta study to investigate factors that enhance students' learning across different countries or bring in other suggestions about "effective pedagogy" (Biesta, 2016). We do not argue for student teachers themselves to undertake constative research approaches in their education with the ambition of finding results that contribute to guiding the teaching profession (Tatto, 2021). However, Mills et al. (2021) and Eriksen (2022) argue that, in an age of data and datafication and evidence-based teaching, teachers need to understand different research approaches and make their own decisions, and that such knowledge would contribute to strengthening teachers' expertise and raising the status of the teaching profession. For example, student teachers need to know that moral and political questions cannot be based on evidence alone (Zeichner, 2007). Therefore, student teachers may acquire relevant knowledge about research for their practice from reading and analyzing constative scientific papers that, for instance, thematise the combination of didactics and subject knowledge. As such, student teachers need to "know about" conceptual knowledge, to be prepared to make their own assessment of other studies, and to be critical, even if they do not perform such research themselves (Eriksen, 2022). They need to be critical toward constative research that is influencing the educational system, for example reforms, commercial interests, or evidence based learning (Tatto, 2021). However, emphasizing constative research approaches too much without making connections to their practice "may disengage student teachers" in teacher education.

Critical research approaches are designed to answer research questions with the purpose of evaluating social realities and in particular consider differences in social and psychological conditions to find out what is stable and what can be socially improved (Kalleberg, 2009). The researcher will contribute to such development by asking prescriptive "should" questions, but cannot contribute objective, value-neutral knowledge about society (Kalleberg, 2009). The researcher's statements about society will, for this purpose, either be characterized by, or challenge the existing social institutions and ways of thinking (Biesta, 2016). As such, we argue that student teachers that pursue "critical" research approaches that are connected to practical teachers work, would develop their ability to become thoughtful practitioners (Eriksen, 2022). Critical research approaches are relevant to the work of teachers with regard to example curriculum, didactics, pedagogy and assessment, because the difference is made through interaction and communication. Student teachers need to be reflexive and critical about others' and their own research, and to critically assess and interpret policy documents, as well as learning resources. Critical research approaches are relevant for student teachers and something they need to "do" to make sense of education empirically. This is because such research is not looking for causes that operate behind the backs of teachers and students, but rather for the reasons that guide their actions, judgement, perception and decision making (Biesta, 2015).

Constructive research approaches have research questions with the purpose of contributing to the transformation of social realities and identifying precisely what is unique or special (Kalleberg, 2009). Such research concerns finding insights that would improve existing structures or practices. Constructive research questions will, for example, ask: "what can and should actors do to improve their situation" (Kalleberg, 2009). From this starting point, investigating new solutions will provide research contributions that are more important than all the unsuccessful solutions one uncovers along the way (Kalleberg, 2009). Epistemologically, this constructive approach is further widened to three different perspectives: technical, practical and critical (Kalleberg, 2009; Kemmis, 2009). The first concerns finding technical solutions to practical problems, the next concerns finding local solutions to local challenges defined by actors, and the last perspective identifies challenges in society and aims for the emancipation of actors. This last perspective is also supported from Habermas' view of knowledge, which expresses values of equality and equal rights for all people and that social science and dialogue must contribute to participation and liberation (Kemmis, 2009). From Kalleberg (2009) exposition, student teachers should also be supported to learn constructive approaches in the form of practice-oriented research, to be able to analyse or develop their own and their colleagues' practice (Stenhouse, 1975). Such constructive research is connected to developing research literacy whereby student teachers can access, interpret and adapt research findings to their own settings (Furlong et al., 2014) and thereby promote schools' improvement (Ulvik and Smith, 2019).

5 Critical approaches in the form of observation and interviews

Next, based upon critical research approaches (Kalleberg, 2009), we elaborate on how observation and interviews can be used beyond studying teachers and schools as objects, and rather, to acquire competence to understand and interpret continually in teachers work. The use of observation creates opportunities to study teacher practice at different levels of the teacher education programme (Brouwer and Korthagen, 2005), while interviews is useful when something cannot be observed and when one is occupied by understanding others experiences through questioning and dialogue (Kvale and Brinkmann, 2018). Observation and interview methods should be taught and connected to the student's practice, particularly in their education, to gain an understanding of the context and complexity of teachers' work. Student teachers could, for example, observe and interview: pupils, teachers, parents, and collaborators in inclusive education, or in relation to curriculum work and professional learning. The student teachers should be able to plan and respond and thereby learn to observe and interview informally and systematically in authentic situations. Such processes would help them develop skills to understand what is being said and not said, and, in addition, learn to link interviews and observation with other information.

For example, in the first year, the student teachers may during their practice period, informally observe teaching by an experienced teacher, and conduct an interview to achieve a deeper

understanding of the observations, and link these with research literature; and further use these to develop a more thorough understanding of the practice of teaching. Such observation and interviews are relevant for the students to acquire the context of teaching and give insights into class management, which would also help them in relating academic knowledge to their practice later. Various observations and interviews during teacher education programmes should be made recurring, as part of both theoretical courses and practice periods in schools. Then both the university teacher educators and practice teachers contribute to enhancing learning potentials and collaboration.

Observation can furthermore be practiced in a variety of ways in teacher education: by participatory or non-participatory approaches, or by using video materials from student teachers' own or other teachers' teaching (Husu et al., 2008; Ulvik et al., 2023). A participative orientation involves combining observation with interviews to reveal new understandings of teachers' work and to contribute to evaluating and developing practice. Student teachers would benefit from learning how to ask students or colleagues questions that reveal understanding, logic argumentation or what Niss (2003) describes as competence to understand or reveal the students' learning. Such practice could be integrated in the practice period of the education programme, with the student teachers focusing on student learning and following one pupil's development closely during practice periods. The aim is to get an insight into pupils' learning and to perceive instruction from the pupils' perspective. This could be supported by facilitating student teachers' observations, and interviews with pupils to understand the observations from the pupils' perspectives and to gain more versatile perspectives on their work (Spernes and Afdal, 2023). Student teachers here learn to utilize various theoretical lenses and practical tools in their observations, as well as to make a distinction between description and interpretation.

It is necessary for student teachers to understand how different theoretical perspectives allow them to perceive various phenomena in the practice of teaching, but also influence what they observe and interpret in and from practice (Grossman, 2007; Husu et al., 2008). Student teachers have observed teaching for many years as pupils, and with their apprenticeship of observation they go into teacher education programmes with solid images of what it means to work as a teacher in a school. These early acquired beliefs need to be challenged during the teacher education programme, as they may impede student teachers' learning (Darling-Hammond, 2006) to become and develop as teachers (Westrick and Morris, 2016). Observation and interviews further involve interpretation of what takes place and, more conceptually, understanding the practice and how to respond to it. Observation could be used to facilitate understanding of the reciprocal interactions among teachers and pupils in the classroom, which may be challenging to realize for student teachers (Brouwer and Korthagen, 2005). Observation also brings insights in practices that need to be developed, to gather data (understanding) of how actions are progressing.

New learning approaches for teaching are also required to develop creative and self-reflective students (Cochran-Smith et al., 2015), where observation and interviews are essential for what Sawyer (2019) describes as guided supervision whereby pupils are activated through open assignments and the freedom to

improvise their own path through the academic material. Student teachers working with inquiry-oriented interpretation will benefit in their professional work from understanding what is going on. Observations and interviews could potentially be collaborative and teach student teachers to initiate what (Vangrieken and Kyndt, 2020) describe as deep-level collaboration between student teachers and practice teachers in teacher education. Peers are a very important source of learning and support for teachers, and the capability of learning together with others should be developed systematically during teacher education (Cochran-Smith et al., 2022). Here, their own perspective might be challenged, and they might consider a far wider set of factors that enables them to reflect more deeply (Penlington, 2008).

6 Constructive practical-oriented approaches

An inquiry-based approach in teacher education helps teachers become lifelong learners (Cochran-Smith et al., 2009). In master's-based teacher education, work related to the bachelor or master's project might create time and opportunities to pursue practice-oriented research approaches. However, the study of the 236 master's theses from UiT, Sæther et al. (2024), found limitations and developed five categories to describe how student teachers approached their master's research project: *Study practice as it is*, *Teacher insight*, *Synthesis of theory and practice*, *Decompose* and *Action research*. The first four are typically conducted by researching others and have a critical approach, while the fifth is about developing new practices using constructive approaches. Sæther et al. (2024) concluded that while the master's thesis seemed to support the development of *research literate* teachers, the use of critical research approaches did not prepare teachers for the kind of constructive research needed in developing their own practice or their school. The first four types of approaches developed knowledge about systematic data collection and analysis, but the results are not implemented in the classrooms. This means that these student teachers are not trained in using research approaches to change or develop their practice. They have taken an important first step by becoming *research literate*, but not the second step by becoming what could be called *research implementers*. By leaving this second step to the teachers to learn, we probably ensure that this will rarely happen. This might indicate a need to go beyond deepening the students' knowledge of research and methods to a stronger focus on research approaches with relevance for professional work (Eriksen, 2022). Next, we elaborate on constructive research approaches in the form of action research that, among other things, was introduced in educational research by Stenhouse (1975), before we present lesson studies.

6.1 Action research

Action research always entails critical reflection: learning from experience (action) through investigating and trying to understand (research) the change process, thinking critically about and conceptualizing what worked, what did not work, how or how

not, and why or why not, and identifying what can be done better on the basis of this learning (Zuber-Skerritt, 2018).

Action research in teacher education is based on a constructive research approach, and the teacher students participates actively in changing interventions in the studied field (Kalleberg, 2009). Action research involves a series of different traditions that might overlap (Kemmis, 2009). For example, Carr and Kemmis (1986) describe action research as a systematic and stepwise process with four main phases: (1) planning, (2) action, (3) observation, and (4) reflection. If necessary, these phases can be repeated in a spiral-like sequence to further develop both the practical results and the theoretical basis for the actions. Stenhouse (1981) further describes such research as systematic inquiry made public. However, he also claims that we should consider what constitutes publication and allow other utterances than traditional academic papers. Ponte et al. (2004), argue that teachers might not turn voluntarily to action research if it is not introduced in teacher education.

Action research has been used in the bachelor thesis in the third year of the piloted master's-based teacher education programme at UiT (Antonsen et al., 2022). Here, the students identified a challenge in the classroom during their practice period that made them curious, possibly in strong collaboration with their practice teacher. They then used the weeks between the practice periods to plan an action or trial to achieve change, and base this on established academic literature and research knowledge. The next practice period the student teacher tried out their plan and decided which methods they would use to gather the data needed for evaluation. From this work, the students expressed how they learned and gained a critical inquiry-oriented attitude toward their own teaching, national and local curricula and, for some students, even their assigned practice teachers in their schools (Antonsen et al., 2022). As such, the former study also found the known challenge of creating a shared understanding of the purpose of action research among students, teacher educators and practice teachers (Vaughan and Burnaford, 2016).

Action research would, for student teachers, involve learning from acting and critical reflection with the intention of understanding their experiences and actions, and with a clear ambition to change and improve their teaching practices in groups or, for example, in a school (Vaughan and Burnaford, 2016). Action research in teacher education could be about investigating teaching, professional learning, curriculum work, inclusive education, collaboration, school development, improvement work or interdisciplinary teaching. The use of action research in education help student teachers be open minded about change and help them be able to improve their teaching or other developmental work in schools (Ponte et al., 2004; Smith and Sela, 2007; Ulvik and Riese, 2016). Action research has long been documented as a strategy for promoting systematic reflection among student teachers (Penney and Leggett, 2005; Vaughan and Burnaford, 2016) and for linking theory and practice in education (Smith and Sela, 2007; Bendtsen et al., 2021). It provides room for reflection that contributes to professional development (Ulvik and Riese, 2016). Such reflection depends on empowerment for teacher students in their practice period, to promote critical and self-critical understanding of their own situation (Kemmis, 2009).

The studies of Ulvik and Riese (2016) and Ulvik et al. (2018) show the challenge to set aside enough time and space to promote reflection and use of academic theoretical perspectives among student teachers after their practice periods at school. This also indicates that it is fruitful to make action research projects small, so they can be fulfilled during education. Even though the analyses of teacher experiences and consideration of theory may have an impact on the understanding of both practice and theory and create an abstract understanding that may have transfer value for initiating new situations (Ulvik and Smith, 2019). Penney and Leggett (2005) and Ulvik et al. (2018) argue that action research is an approach for students to assess their practice more critically, which is necessary to be prepared for a dynamic teaching profession. This because action research is often based on a constructivist understanding of learning, where knowledge is formed through activities and experience that have both practical and theoretical goals (Reason and Bradbury, 2001). This implies that the research is not conclusive (Mertler, 2017). As such, despite their intentions, action research projects have not significantly impacted broader social and organizational transformations. This limitation arises from the fact that these projects are typically structured as isolated interventions rather than systemic initiatives (Brydon-Miller et al., 2003).

6.2 Lesson studies

Lesson studies involves a group of teachers who together plan their teaching based on topics, observe each other and the students to examine their practice, and improve their teaching and class management together (Elliott and Tsai, 2008; Ming Cheung and Yee Wong, 2014). Lesson studies may be used as a strategy for teachers to work on their art and artistry and to promote inquiry-oriented teachers. Lesson studies have similarities with action research, as they both involve experimental cycles of action and reflection (Elliott and Tsai, 2008). Lesson studies entail a collaboration, as the teachers discuss and agree on their improvements together (Elliott and Tsai, 2008). According to Willems and Van Den Bossche (2019), students may benefit from lesson studies in groups during their education, and as such can tailor an intervention and analyse the outcome using observation data and reflection in combination with theory (Fauskanger and Bjuland, 2019). Familiarity with such practices will also benefit the students in their future work, as they can use them to develop their own and collaborate on improving practices in their schools. According to Elliott and Tsai (2008), lesson studies will have a narrower agenda to improve the teaching based on observations, rather than the wider approach that action research offers for improving teaching or other development work in schools.

7 Discussion

Based on the Finnish and Norwegian context, we have argued that research approaches learned in master's-based teacher education need to relate to the practical work of teaching. We have elaborated on student teachers' need for knowledge

TABLE 1 Research approaches characteristics, implications and examples.

	Constative research approaches	Critical approaches in the form of observation and interviews	Constructive practical-oriented approaches
Characteristics	Research aims to understand causal effects and obtain causally clear answers about what to do in teachers work	Research takes the form of observation and interviews, evaluating social realities and considering differences in teachers' work to determine what is stable and what can be socially improved	Teacher students engage in action research and lessons studies investigating "what can and should actors do to improve our situation"
Implications	Teacher students need to understand and be critical to different types of research that influence teachers' work	Teacher student should be able to plan and respond, thereby learn to observe and interview informally and systematically in authentic teacher work. These processes would help them develop skills and be reflexive, understanding what is being said and not said. Additionally, they would learn to link interviews and observation with other information	Student teachers in a master's-based teacher education programme need to carry out action research and lesson studies during their practice period. They should also connect this experience to post-practice work in teacher education programmes, such as written presentations or reports
Practical examples of integrating research in teacher education	Using and critically analyzing literature from constative research approaches. Such literature can be integrated into various courses within master-based teacher education	Observation and interviews can be incorporated into different courses. For instance, teacher students could observe and interview pupils, teachers, parents, and collaborators. These interviews and observations could also connect to the development of subject and subject didactics, pedagogy and teaching	Action research can be utilized in courses and practice periods related to developing teacher plans, understanding the teachers role, teaching, subject didactics, general pedagogical knowledge, professional learning, curriculum work, inclusive education, collaboration, school development, improvement work or interdisciplinary teaching

about constative research by reading research articles and gaining insights and being critical about a variety of research methods in education. Furthermore, we have argued for critical research approaches that promote closeness to practice and an inquiry-based reflective attitude in the form of observation and interviews for understanding and interpretation, and constructive practice-based approaches such as action research or lesson studies. Observation and interviews may take place during everyday practice, while action research and lesson studies are planned activities with set agendas.

There is limited time to learn research approaches, even in a 5-year research-based teacher education programme, and as such the time allocated for these activities, must be considered, and integrated in relation to other needs in the curriculum, such as to example learning pedagogy and subject knowledge. Furthermore, the student teachers need to reflect carefully and be critical about research that they want to use in their teaching or school development, as claimed by Biesta (2015). It is to be expected that student teachers' engagement and experience from observations, interviews and practice-oriented research, such as action research and lesson studies, could promote and strengthen their autonomy (Vangrieken and Kyndt, 2020), as they will themselves either individually or in collaboration be able to try out new innovation in teaching and evaluate it for further improvements (Stenhouse, 1975). Autonomy is a prerequisite for being a professional teacher (Vangrieken and Kyndt, 2020). Since teaching is not merely a technical endeavor (Flores, 2020), teachers need to be empowered to make their own decisions. Furthermore, when using these methods, student teachers could collaborate to analyse practice experiences that involve deep-level collaboration (Vangrieken and Kyndt, 2020), as collaboration is essential and transferable to professional work (Hargreaves, 2019). This approach would also encourage student teachers to study and develop their own work, rather than treating schools and teachers as mere objects. Some informants have already expressed fatigue with this approach in

Norway (Engelsen et al., 2024). Setting practice-based research on the agenda for student teachers also gives them knowledge and tools that can potentially be used in inquiry-oriented teaching (Cao et al., 2023). The new teachers in schools encounter practices that are hectic, chaotic and complex (Lampert, 1998; Lundahl, 2016), so these research approaches would help them make sense of and understand the reality that they encounter in the schools. Master's-based teacher education could as such help student teachers to become professional teachers that could promote critical and practical wisdom through experience, reflection and discussion (Husu et al., 2008; Toom et al., 2010). Reflection implies a dialogue with the world in which people question their own actions (Penlington, 2008). Analyzing experiences and considering theory may have an impact on the understanding of both, and create an abstract understanding that may have transfer value for new situations (Kemmis, 2010).

One implication of our arguments is the need to integrate critical and constructive research approaches in the form of observation, interviews and practice-based research approaches cohesively into master-based teacher education curricula both nationally and locally. In Table 1, we provide characteristics, implications, and some examples of how this may be done.

7.1 Implications for research

The use of critical and constructive research approaches in the form of observation and interviews, action research and lesson studies to prepare teacher students for teachers work, needs to receive further research attention in teacher education programmes. Further, there is a need to investigate how the use of these research approaches may bridge the gap between theory and practice in master-based teacher education (Drageset et al., 2024). Here, the use of tripartite collaboration, as mentioned by the Advisory Panel for Teacher Education (2020) between researchers,

teacher students, and teachers may contribute to such bridging (Blomsø et al., 2023), but need to be scaled up. Additionally, there is a need to investigate the process of student teachers undertaking master's thesis research that engages them in practice, and how they should report this process in a master's thesis. Here, there is also a greater need to include a focus on content knowledge, as also claimed by the Advisory Panel for Teacher Education (2020).

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

YA: Conceptualization, Funding acquisition, Project administration, Writing – original draft, Writing – review & editing. AT: Conceptualization, Writing – original draft, Writing – review & editing. MU: Conceptualization, Writing – original draft, Writing – review & editing. OD: Conceptualization, Writing – review & editing. KO: Funding acquisition, Writing – review & editing. FH: Funding acquisition, Writing – review & editing. K-AS: Conceptualization, Writing – review & editing.

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Conflict of interest

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