

What Characterizes Nordic Research on Initial Teacher Education: A Systematic Scoping Review

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ABSTRACT

The main objective of this systematic scoping review is to shed light on ITE research in the Nordic countries during the past decade. The review includes 830 studies, following established procedures. Based on our analyses we find that Nordic ITE research is mainly on ITE for the compulsory and upper secondary school years. Researchers use qualitative data, view studies, and cross-sectional studies more than other methods and designs, and show more interest in STEM, pedagogy, and 21st century skills. A digital gap map accompanies this article and provides insight into future research needs.

Keywords: *initial teacher education, Nordic research, scoping review, research-based teacher education*

1. Introduction

Teacher education has become contested territory, as Moon (2016, p. 1) pointed out, with ideological forces interacting with historical structures and ideas. The main lines of argument relate to whether teaching is a craft or a science, where teacher education should take place, and who should be responsible. This discussion has had different outcomes in different countries, with England being an example of where a lot of teacher education responsibility is placed in schools, not universities.

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The Nordic countries have historically answered these questions differently. In Finland, teacher education takes place in a university at the master's degree level since the 1970s (Niemi, 2016). Iceland also introduced a five-year master's degree program in 2008 (Björnsdóttir, 2022), and in Sweden, following what Furuhausen et al. (2019) have described as a constant shift between progressivist and academic orientations, teacher education settled into an academic position requiring a master's degree for teachers in the compulsory schools. In Norway, teacher education for the compulsory school years required a master's degree in 2017, following several reforms focusing more on research-based teacher education (Munthe & Rogne, 2015; 2016). Denmark is the "odd one out", maintaining a four-year bachelor's degree as the requirement for teachers in compulsory school grades. In Denmark, teacher education is also placed within colleges for the professions, not within universities.

The countries that place initial teacher education (ITE) in universities emphasize the role of research, as well as practice. The role of research is many-faceted, involving: research-based curricula for pre-service teachers; research as something that is discussed and critiqued; research as a scientific practice in which pre-service teachers and teacher educators are involved; and research on teacher education as a knowledge foundation for the development of teacher education (see Alvunger & Wahlström, 2018; Björnsdóttir, 2022; Munthe & Rogne, 2015).

Using research to guide or enlighten the development of teacher education programs is conditioned on having easy access to research. It is also important that new research projects build on what others have done, and continue to aggregate and conceptualize knowledge for teacher education. Our contribution is to create an interactive database freely available online (Link: <https://www6.uis.no/Alle-UiS/ksu/6-12-2023-11-32.html>), containing searchable studies with complete references and abstracts on all the internationally published studies of teacher education in the Nordic countries, which we have identified through a systematic scoping review. We have not found any previously published studies that systematically identify and analyze research on teacher education from the five Nordic countries, and believe that the current study can provide valuable information for all countries. In addition, our study has resulted in an interactive digital database containing all included studies and available for free use. Limiting our selection to studies published in English, we aim to make our database equally available to Nordic researchers and the global research community. The database allows researchers to identify relevant studies in their field efficiently and will be an important resource for teacher education and teacher education researchers in the Nordic countries, as well as internationally.

The main question we will pursue in this paper is: What characterizes research (published in English) on teacher education in the Nordic countries? Which topics have been studied and which methods are used? Can we identify commonalities or differences in research on ITE (i.e., on policies, programs, teaching and learning, students, teacher educators, and more) across the Nordic countries?

2. Method

This study is a systematic scoping review accompanied by a digital database. As a scoping review, it is an a-theoretical study since we are attempting to describe a field without using a particular lens. According to Gough et al. (2013, p. 138), scoping refers to “preliminary examination of a field of research”. A scoping review provides information on the extent and nature of research on the theme of the scoping review, and on the need to conduct a systematic review (Grant & Booth, 2009, p. 101) of the theme or subthemes of the scoping review. As with any systematic review, scoping reviews are systematically conducted, transparent, and replicable (Grant & Booth, 2009; Munthe et al., 2022).

When reporting, we will follow the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (Page et al., 2021). The guidelines are intended to secure a rigorous and transparent reporting process and include: presenting the whole search strategy; presenting a priori inclusion and exclusion criteria for articles resulting from the searches; documenting search results; and specifying the screening, coding, and analysis processes.

2.1 Search strategy

When planning a systematic review study, several decisions must be made. Booth et al. (2018) refer to seven different factors to consider when deciding what kind of systematic review to undertake: 1) the review question; 2) epistemology; 3) your timescale or time limit; 4) resources available; 5) expertise in the group; 6) audience and purpose; and finally 7) type of data. For this study, the main goal is to scope the field of teacher education research carried out in a particular geographical region. We expect the data to be both qualitative and quantitative, using many different designs and asking many different questions. Synthesizing the results of the research will therefore not be possible, since that requires fairly similar kinds of data and of course similar research topics. Scoping reviews are descriptive reviews that provide overall analyses of the research field, and provide a kind of “picture” or “map” of what the research looks like in a field. A scoping review can provide answers to questions like “Which topics are most prevalent?” or “Which countries publish the most research on this topic?”

Important questions are where to search and what kind of research to include. The decisions here are contingent and require a rationale. We decided to constrict our search to the period 2010–2020. In this way, we would access the newest research, which we believe might also be more relevant for teacher educators working in ITE programs today, as well as reveal future research needs.

Another decision was to restrict our search to international research databases and include only peer-reviewed articles written in English. This was a difficult decision to make, as we are very aware that a lot of research is written in the Nordic languages. Including all five Nordic languages would, however, complicate the search process tremendously, as it would entail handsearching national journals and websites.

It would also require that we were able to read and understand all five languages. A third and major consideration was that the outcome we sought was a scoping review with a digital database, which would also be both interesting and helpful to researchers outside the Nordic countries. For these reasons, we decided to include only English language journal articles.

Systematic searches were carried out in four databases: Scopus, ERIC, Psycinfo and ASP.

The first section of the search string consists of synonyms for initial teacher education (initial teacher education, teacher training, teacher preparation), as well as terms for students involved in teacher education (pre-service teacher, teacher candidate, student teacher). The second section consists of the five Nordic countries: Norway, Finland, Sweden, Denmark, and Iceland. As an example, we provide the search string used for our search in Scopus:

TITLE-ABS-KEY("initial teacher education" OR ITE OR (teacher W/4 educat*) OR "pre-service teacher education" OR (teacher W/4 training) OR (teacher W/4 preparation) OR "pre-service teacher" OR "student teacher" OR "teacher candidate") AND (LIMIT-TO (AFFILCOUNTRY, "Sweden") OR LIMIT-TO (AFFILCOUNTRY, "Finland") OR LIMIT-TO (AFFILCOUNTRY, "Norway") OR LIMIT-TO (AFFILCOUNTRY, "Denmark") OR LIMIT-TO (AFFILCOUNTRY, "Iceland") OR LIMIT-TO (AFFILCOUNTRY, "Greenland")) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "re")) AND (LIMIT-TO (LANGUAGE, "English"))

This resulted in 2,886 articles after duplicates were removed (see Table 3).

2.2 Screening and a priori inclusion and exclusion criteria

The articles were uploaded to EPPI-Reviewer, a digital software program for performing systematic reviews (Eppi Centre, 2022).

The inclusion and exclusion criteria determined a priori were as follows (see Table 1):

Table 1: Inclusion and exclusion criteria

	INCLUSION CRITERIA	EXCLUSION CRITERIA	EXAMPLES OF EXCLUDED PUBLICATIONS
Year	Publication date in/ after 2010.	Publication date before 2010.	
Country	Includes data from at least one of the countries, Norway, Finland, Sweden, Denmark, or Iceland.	Does not include data from at least one of the Nordic countries.	
Type	Peer-reviewed articles.	Not peer-reviewed articles.	Conference papers, book chapters, reports.
Language	Published in English.	Not published in English.	

	INCLUSION CRITERIA	EXCLUSION CRITERIA	EXAMPLES OF EXCLUDED PUBLICATIONS
Topic	Data is concerned with initial teacher education.	Not concerned with initial teacher education.	Informants are in-service teachers, research is concerned with pupils in schools.
Evidence	Includes data and data-analysis collected for this study.	Does not include data and analysis collected for this study.	The author presents own ideas or examples without providing any data-analysis. Theoretical essays with no empirical data.

The articles were screened in two rounds. The first round was based on title and abstract, and led to the exclusion of 1,914 articles (mainly due to topic, see Figure 1). The second round was based on full text, which led to a further reduction of included articles. All screening was conducted by both authors independent of each other. As Figure 1 depicts, the two rounds of screening resulted in 830 articles being included.

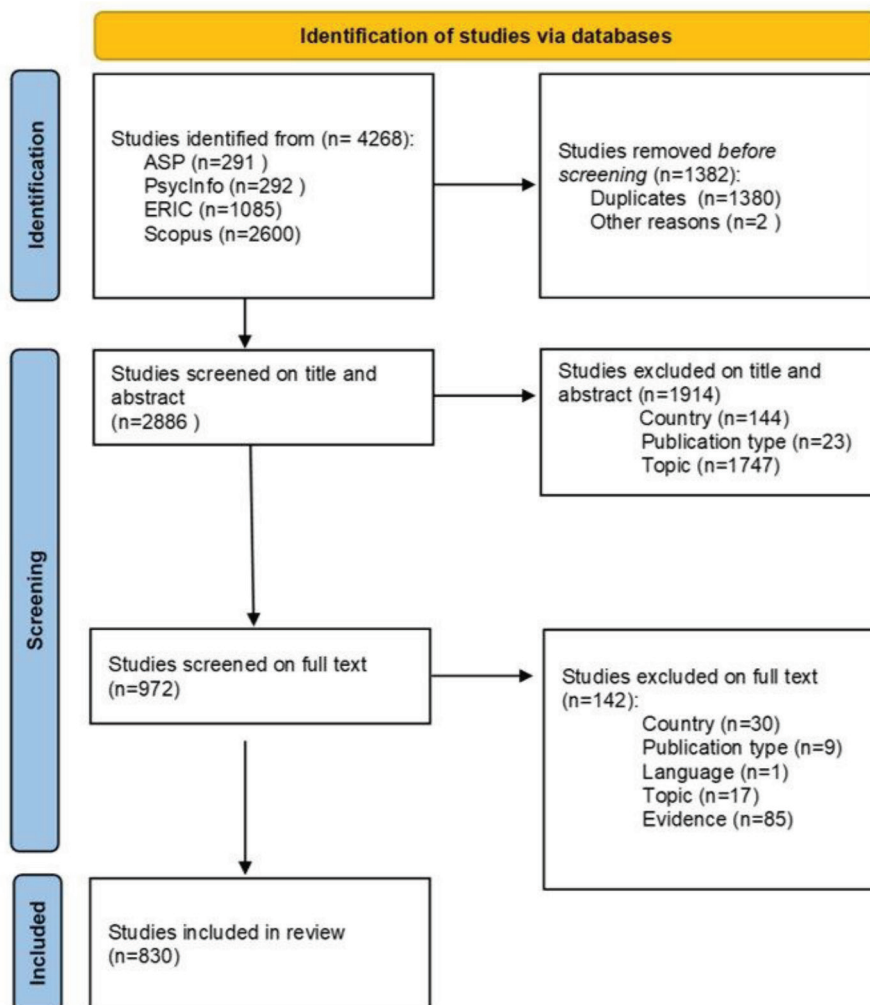


Figure 1: The flow-diagram

2.3 Coding

Due to the screening process, both authors knew what kinds of research articles were included, and discussions on the coding scheme started. Using large sheets of paper and post-it notes, we designed a possible coding scheme that could give us the kind of information we were looking for in a scoping review.

We agreed on eight main categories: the teacher education type; the study topic; the country in which the research is carried out; the study design; the study method; the types of data; the study object; and the informants for the study. A coding protocol was devised and created in the EPPI-Reviewer program that was used throughout this study. (EPPI-Reviewer is an online program for systematic reviewing developed and maintained by the EPPI Centre at University College London.)

Coding can seem a simple task, but there were several instances in which the two authors needed to discuss what the correct code could be, either because the study did not explicitly state this information and it needed to be gauged from the results, or because a study could be coded under several variables. Teacher education type was one of the challenging coding items because: first, this information was not always explicitly stated (particularly the case for elementary and secondary ITE); and second, there are different kinds of teacher education structures in the different countries. For instance in Finland, subject teacher education often referred to secondary teacher education, and so-called classroom teacher education meant elementary teacher education. In Norway, the focus was often on teacher training for grades 1–7 and/or 5–10. We solved this problem by coding Finnish subject teacher education in secondary teacher education, and Norwegian teacher education for grades 5–10 both in elementary and secondary teacher education. If the type of teacher education was not provided, we coded the article as both elementary teacher education and secondary teacher education.

Since this scoping review is accompanied by an interactive digital database, all readers can access our coding for each variable.

3. Results

Finnish teacher education has the highest number of internationally published studies during 2010–2020. We have identified 353 studies from Finland, 267 from Norway, 240 from Sweden, 34 from Denmark, and 8 from Iceland. There has been a steady increase of research on ITE in Finland, Sweden, and Norway between 2010–2020, but Iceland and Denmark do not have the same development. In 2010 there were 12 studies from Finland, 10 from Sweden, 8 from Norway, 2 from Iceland, and 1 from Denmark. In 2020 there were 59 studies from Finland, 36 from Sweden, 46 from Norway, 1 from Iceland, and 4 from Denmark.

3.1 The teacher education type

Most of the studies focused on elementary (556 articles) or secondary school teacher education (476 articles), followed by ECEC (119 articles), and Physical Education ITE (50 articles). Only 24 articles discussed vocational teacher education, 16 articles were about music teacher education, and seven articles were on art teacher education.

The studies discussing Norwegian teacher education focused mostly on secondary teacher education (189 articles), whereas 171 articles discussed elementary teacher education, 33 articles were on ECEC, and seven articles dealt with vocational teacher education in Norway. The studies on Finnish teacher education focused mostly on elementary teacher education (258 articles), 173 articles studied secondary teacher education, 22 articles were on ECEC, and seven articles were on vocational teacher education. The Swedish studies focused mostly on elementary teacher education (153 articles), secondary teacher education (130), ECEC (66), and six articles on vocational teacher education. The Danish studies focused on secondary teacher education with 25 articles, 22 articles on elementary teacher education, and three on vocational teacher education. None of the articles found in this review discussed ECEC teacher education in Denmark. The Icelandic studies focused mostly on elementary teacher education (seven articles), six on secondary teacher education, and three on ECEC teacher education. None discussed vocational teacher education in Iceland.

Based on this review, there are more published papers on secondary teacher education from Norway, elementary teacher education from Finland, and ECEC teacher education from Sweden.

3.2 Teacher education subjects

Figure 2 provides an overview of teacher education subjects that were studied in the five countries, and in total. As we can see, STEM subjects were the most studied (193), followed by pedagogy (146), languages (80), art (43), sports, health or food (40), religion, social studies and history (27), and special education (20).

STEM subjects were the most studied subjects in Finland, Sweden, and Denmark. In Norway, research on pedagogy is almost as prevalent as research on STEM subjects. Languages were studied most in Norwegian teacher education, and arts and crafts in Finnish teacher education. Studies considering ITE in Iceland focused on languages, arts and crafts, and special education. We did not identify any studies discussing STEM subjects or pedagogy in Icelandic ITE.

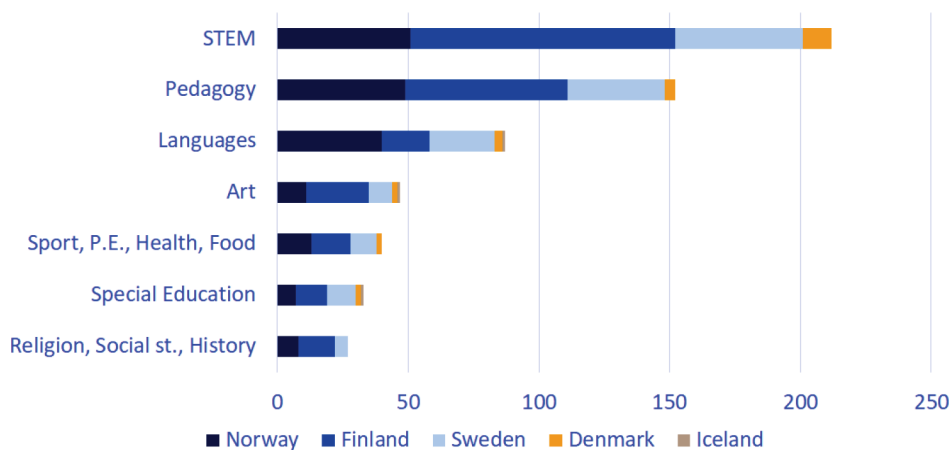


Figure 2: The studied teacher education subjects in each Nordic country

3.3 The topics studied

We identified and coded eight different topics that were evident in the research papers. The most studied topics were: “21st century competence”, “teacher educators and teaching in ITE”, and “becoming a teacher” (Figure 4). As shown in Figure 3, “21st century competence” was the most prevalent topic (223 studies), but there was a decrease in 2020 (Figure 4). This category included studies on: digital technology and digital competence; collaboration; creativity; critical thinking; communication or entrepreneurship; inquiry; sustainable development; and democracy (figure 4). One example of a study in this category is Amhag et al. (2019), which studied teacher educators’ use of digital tools and the need for digital competence in higher education.

The second most prevalent topic was “teacher educators and teaching in ITE” (204 studies, Figure 3). This category includes studies on: teaching and learning in ITE; teacher educators’ competencies; practices; and teaching methods; as well as studies on the characteristics of teacher educators. An example is Andreasen et al. (2019), who studied teacher educators’ teacher identity in Norwegian teacher education.

The third most prevalent category, “becoming a teacher”, included 203 studies discussing, for instance, student teachers’ teacher identity, or students’ reflections and views on their studies or future profession as a teacher. One such study was by Poom-Valickis and Löfström (2019), who aimed to understand the development of student teachers’ professional identity by interviewing 13 student teachers at the end of their ITE program.

Studies in the category “ITE curriculum and policy” (130 studies, Figure 3) analyzed programs, curriculum, and policy documents for teacher education in the Nordic countries. For instance, Afdal (2013) compared policy-making processes in Finland and Norway.

The category “field practice” (140 studies, Figure 3) was divided into three different subcategories. The first category considered international field practice, the second mentoring and assessment, and the third included studies on student teachers’ teaching during field practice. An example study is Ärlemalm-Hagsér (2017), who analyzed workplace-based learning experiences in early childhood teacher education in Sweden.

“Diversity” includes 95 studies on equal rights, multicultural education, multilingualistic and inclusive education. For instance, Ragnarsdóttir (2010) studies whether the experiences of ethnic minority student teachers reveal barriers to integration within the Icelandic educational system. Acquah and Commins (2015) examined the role of critical reflection in student teachers’ awareness of cultural diversity.

“Research-based teacher education” includes 84 studies discussing research-based teaching, the use of research-based knowledge in ITE, and how research-based education is understood by teacher educators and students (see Aspfors &

Eklund, 2017; Munthe & Rogne, 2015), or in ITE curricula (see Afdal, 2017). Other studies included are related to the use of action research or lesson study (Bjuland & Helgevold, 2018; Bjuland & Mosvold, 2015; Rasmussen, 2016), master thesis supervision (see Jónsdóttir et al., 2015), or other kinds of student teachers' research projects and mentoring of these projects.

The “assessment” studies were predominantly concerned with the assessment and examination of student teachers' learning in teacher education (see Adalberon, 2020) and students' self-assessment of their learning (see Oscarson, 2016).

In Finland the most prevalent topics are 21st century skills and becoming a teacher. In Norway, the most prevalent topics are teacher educators and teaching, and field practice. Swedish research emphasizes 21st century competence to a certain degree as well, but other topics are more equally weighted.

All topics were studied during the whole period 2010–2020. The topics of becoming a teacher, teacher educators and teaching in ITE, and 21st century competence showed an increasing trend as seen in Figure 4. Figure 4 illustrates the annual frequency of each topic between 2010 and 2020. The number of studies dealing with assessment has remained consistently low between 2010 and 2020 (Figure 4). On the country level, assessment was most studied in Sweden (19 articles) and Norway (13 articles), and was not discussed in studies identified by our search on teacher education in Denmark and Iceland.

In the studies discussing 21st century competence, digital technology and digital competence were the main topics (Figure 5). Most of these studies were conducted within Norwegian and Finnish teacher education programs. The four C's and inquiry were most prevalent in studies on Finnish teacher education. Most of the papers on Danish teacher education studied sustainable development. Democracy was most prevalent in the Swedish studies.

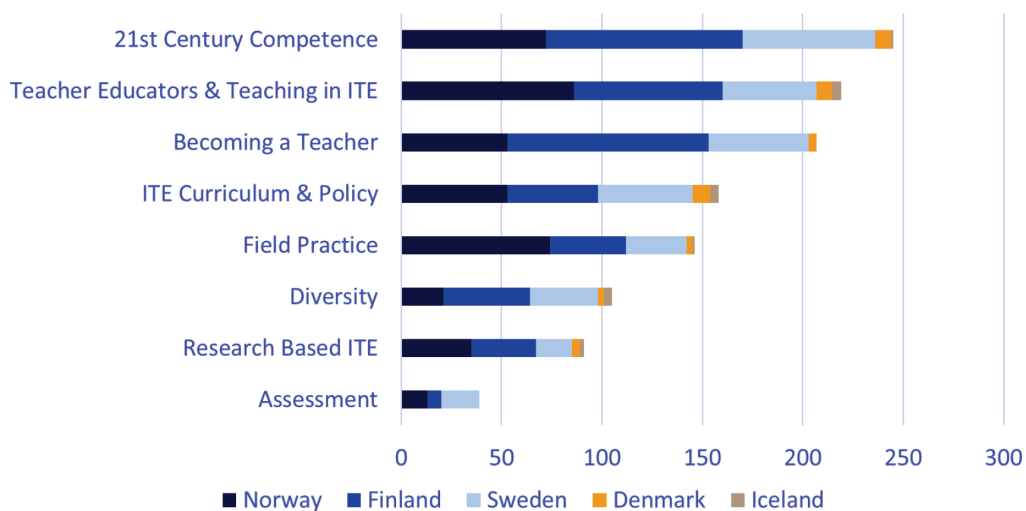


Figure 3: The studied topics in each Nordic country

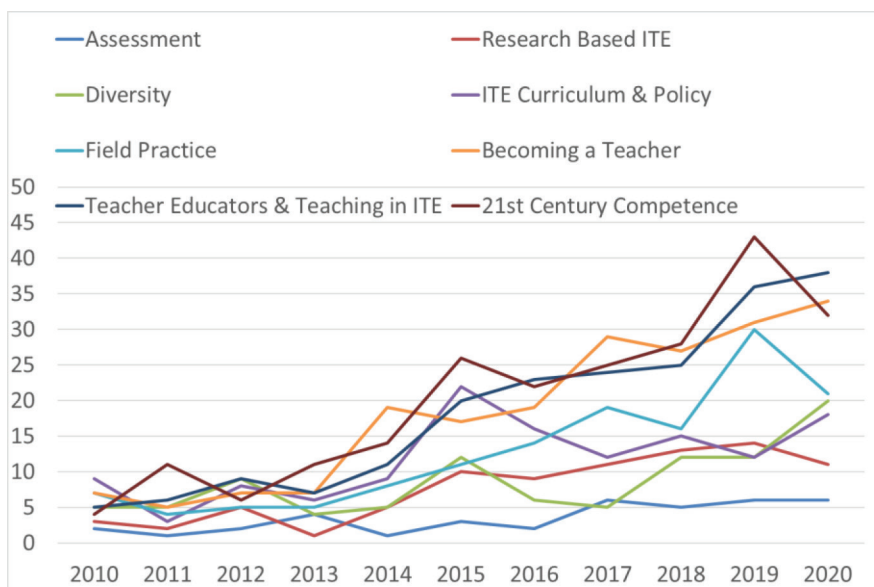


Figure 4: The development of different topics during 2010–2020

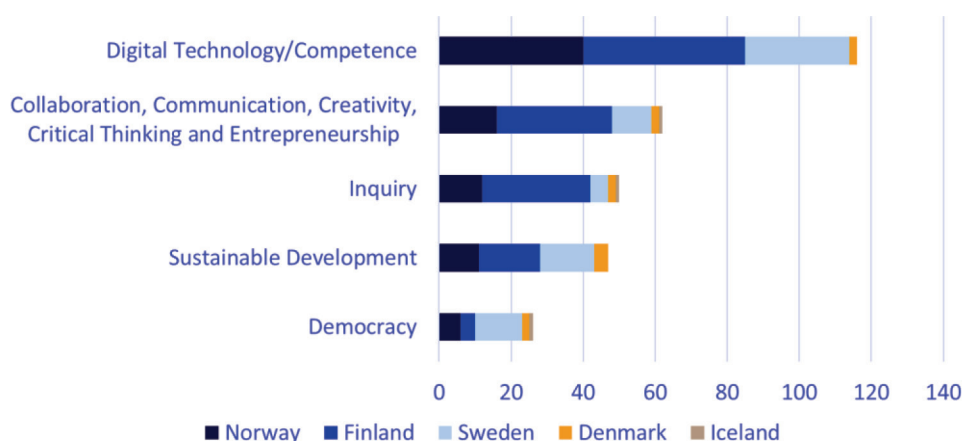


Figure 5: 21st century competence

3.4 Methods used

A very clear result in relation to methods is that qualitative methods dominate in all five countries (Figure 6). Mixed methods or multi-method studies were used more often than only quantitative studies in Denmark (Figure 6). In Figure 6, we can also see that “review study” is included as a research method. Reviews will often include studies from many countries, and for our purpose, we chose to include reviews if at least one primary study was concerned with research on a Nordic teacher education program.

The number of qualitative studies was much greater during the whole period, and the proportional growth of qualitative studies was much greater during the most recent years.

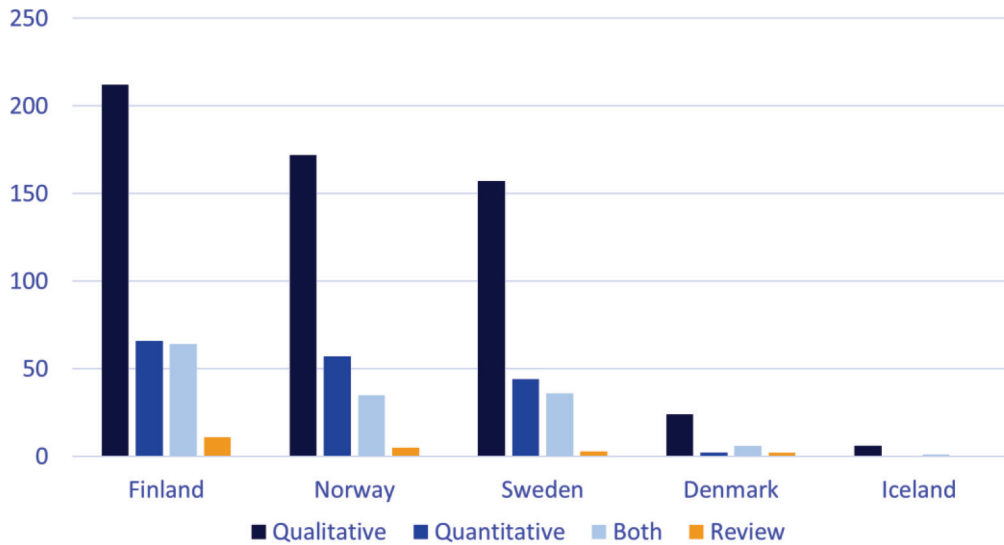


Figure 6: The study methods in each Nordic country

3.5 The study designs

During the coding process, we soon discovered that not all categories for study design were mutually exclusive. Therefore, in some cases the same study could be coded in more than one study design category. An example is Afdal (2012), who compared teacher education curricula in Norway and Finland. The study was both a document study and a comparative study.

The design most used in the 830 publications we have included, was view study/reflection study (296 studies, Figure 7). Very many of these studies were found within the topic “becoming a teacher”. View/reflection studies were most prevalent in research on Finnish teacher education, second in Norwegian studies, and third in Swedish studies. View/reflection studies were often interested in teacher students’ professional identity or students’ experiences (see Arneback et al., 2017), emotions (see Anttila et al., 2016), views (see Byman et al., 2021), and reflections on their studies or profession. The data collection methods in these studies were often interviews or student-generated data, such as portfolios or reflection texts.

There were also quite a few cross-sectional studies, implying that data collection was at one point of time only. This could be interview studies, where the interviews were carried out once, or questionnaire studies with one data collection point (see Karlsudd, 2018). Most of the cross-sectional studies were on Finnish teacher education, followed by Norway and Sweden (Figure 7).

The view/reflection study design was the most used design for research on Finnish, Swedish, Norwegian, and Icelandic teacher education programs. The most prevalent design for research on Danish teacher education was document study.

What is equally interesting, is which designs are used the least in the studies identified. Here we can see that longitudinal designs are not prevalent, nor are more experimental designs or designs with pre and post-testing. Also few researchers have made use of secondary data analysis, for example using register data to study pathways.

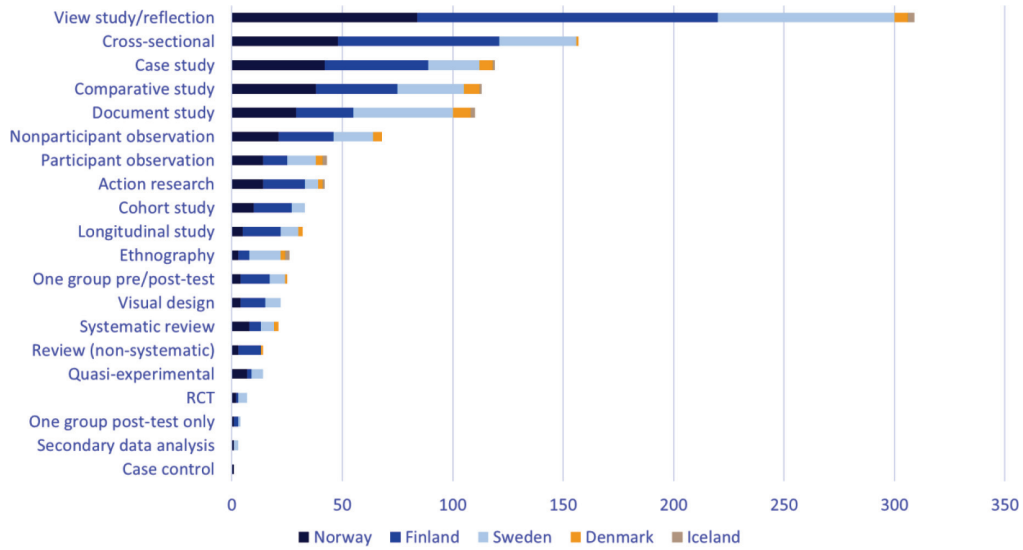


Figure 7: The study design in each Nordic country

3.6 The data collection methods

The most common data collection method was a questionnaire (Figure 8), followed by informant-generated data. Questionnaires were used both in quantitative studies (125 articles) and qualitative studies (55 articles). In some of the studies, the data from the questionnaires were complemented by other data collection methods, such as interviews. For instance, Kellner et al. (2011) used follow-up semi-structured interviews after the open-ended questionnaires to investigate student teachers' initial conceptions about students' difficulties in science and mathematics.

The distribution between countries in each data collection method was quite similar, except for the group interview, which was more prevalent in research on Norwegian teacher education.

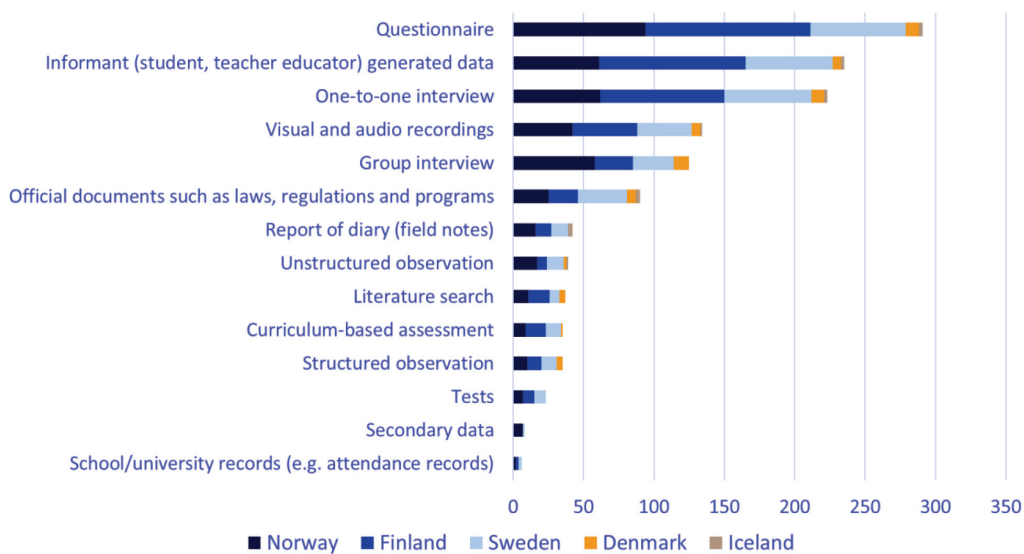


Figure 8: The data collection methods in each Nordic country

3.7 The study objects

As seen in Figure 9, it is quite clear that the studies focused mostly on student teachers. This was the case for all countries except Iceland, where there were two articles on student teachers and three articles on teacher educators. Teacher educators were studied more in Norway. For instance, MacPhail et al. (2019) discuss teacher educators' professional development and the skills needed for teacher educators. The study is conducted by interviewing teacher educators from different countries, Norway being one of them.

Study programs were studied in Finland (39 articles), Norway (35 articles), Sweden (33 articles), and Denmark (5 articles). Many of the studies compare study programs in different countries (see Andrysová & Chudý, 2019).

Teacher educators at school were studied in Norway (12 articles), Finland (12 articles), and Sweden (7 articles). An example is Jonasson (2019), where student teachers were informants together with teacher educators at school. The study was conducted in Sweden.

ITE policy and practice were studied in all five countries. An example of these studies is Sigurdardóttir (2010), who addressed school-university partnership in teacher education from a policy and practice perspective (Iceland).

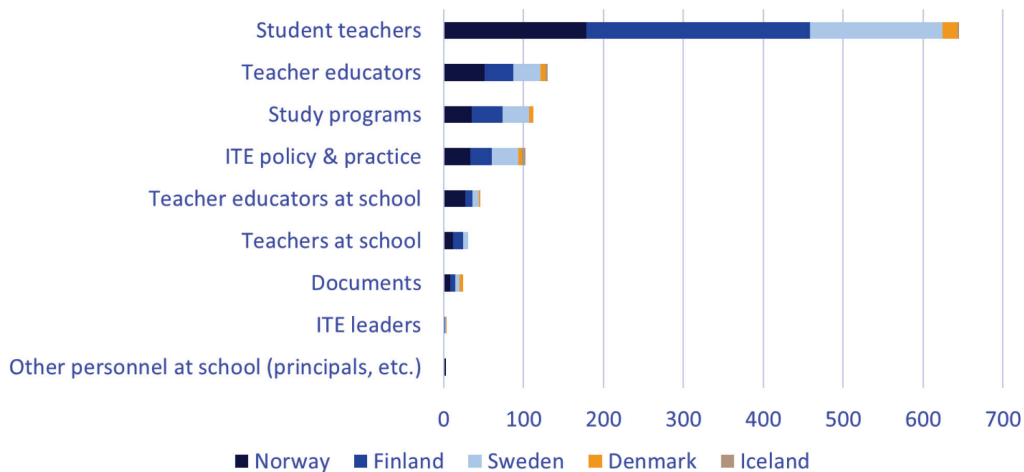


Figure 9: The study objects in each Nordic country

4. Discussion

This study has its limitations. We have not been able to conduct an exhaustive search for all research on teacher education in the Nordic countries. We have also used a ten-year cutoff for included studies. As such, we provide a partial picture of Nordic research on teacher education.

This is, however, the most exhaustive review in existence, and we believe the search terms used and the four databases searched have produced a solid foundation of English language publications.

Table 2 summarizes the main characteristics, and answers the first two research questions we posed: What characterizes research (published in English) on teacher education in the Nordic countries? Which topics have been studied and which methods are used?

Table 2: What characterizes research on ITE in the five Nordic countries?

COUNTRY	ITE TYPE	TOPIC	SUBJECT	DESIGN	METHOD	STUDY OBJECT
Finland	The focus is mostly on elementary teacher education, followed by secondary teacher education. ECEC teacher education is the least studied in Finland. There are also few studies on vocational teacher education.	“Becoming a teacher” is the most studied topic, followed by “21st century skills”. The least research is on “assessment”(Figure 3). In the studies discussing “21st century skills” the focus is mostly on digital technology and competence, followed by collaboration, communication, critical thinking, creativity and entrepreneurship, together with inquiry (Figure 4).	STEM subjects are the most studied teacher education subjects, followed by pedagogy, most of the arts, religion, social studies and history. Teacher education research considers Finnish teacher education (Figure 2).	View/reflection study is clearly the most common study design, followed by cross-sectional studies (Figure 7). Most of the action research, cohort studies, longitudinal, and one group pre/post-test studies are also on Finnish teacher education.	Most of the studies used questionnaires, informant generated data, or one-to-one interviews as data collection methods (Figure 8).	As in all the Nordic countries the focus was mostly on student teachers (Figure 9).
Norway	The focus is mostly on secondary school teacher education. Most of the physical education teacher education research deals with Norwegian teacher education.	The topics were more evenly distributed (Figure 3). The focus was mostly on “teacher educator and teaching in ITE”, together with “field practice”. All the categories in “21st century competence” were discussed, but digital technology and competence were clearly the most studied.	The STEM subjects are studied the most, but the subject of pedagogy was studied almost as much (Figure 2). Languages were also widely studied, and the most language studies were in Norwegian teacher education.	View/reflection study is the most common study design, followed by cross-sectional, case, and comparative studies (Figure 7). Most quasi-experimental studies related to Norwegian teacher education.	Questionnaires and interviews (both one-to-one and group) were common (Figure 8). Most group interviews were in the Norwegian context.	Student teacher, but also teacher educators, and ITE policy and practice were the studied objects (Figure 9).
Sweden	The focus is mostly on elementary school teacher education. Most of the ECEC teacher education research was on Swedish teacher education.	The topic of “21st century competence” is the most studied topic (Figure 3). However, the differences between the different topics are not very large in the research. Regarding studies discussing “21st century competence”, the focus is mostly on digital technology and competence (Figure 4).	All the teacher education subjects were discussed. The focus was mostly on STEM subjects (Figure 2).	View/reflection study is clearly the most common study design (Figure 7). Document study is the second most common document studies were on Swedish teacher education.	Questionnaires, informant generated data, and one-to-one interviews were the most common data collection methods in studies (Figure 8).	The focus was mostly on student teachers (Figure 9).

COUNTRY	ITE TYPE	TOPIC	SUBJECT	DESIGN	METHOD	STUDY OBJECT
Denmark	The research focuses mostly on elementary and secondary teacher education.	The topic of "assessment" is not studied, otherwise the topics were quite evenly distributed (Figure 3). The most studied topics are "teacher educators and teaching in ITE", "ITE curriculum and policy", and "21st century competence". All the categories in "21st century competence" are included in the research, but most focus was on sustainable development (Figure 4).	All the teacher education subjects were discussed, except history, social studies, and religion (Figure 2). Most of the studies considered STEM subjects.	Document study was the most common study design, followed by view/reflection study, comparative study, and case study (Figure 7).	The different data collection methods regarding the research are quite evenly distributed between questionnaires, one-to-one interviews, and group interviews (Figure 8).	The focus in studies is mostly on student teachers, but all of the other study objects are present in the research, except teachers at school (Figure 9).
Iceland	The studies handle ECEC, elementary and secondary teacher education.	The most studied topics were, "teacher educators and teaching in ITE", diversity, and "ITE curriculum and policy".	The discussed ITE subjects were languages, arts and special education.	View study/ reflection study was the most common study design.	Questionnaires and field notes were the most used data collection methods.	Student teacher, but also teacher educators and ITE policy and practice were the studied objects (Figure 9).

If we look at the research across all countries, we can say that the research is mainly characterized by

- Being conducted on ITE for the compulsory school years and upper secondary ITE
- Being based on qualitative data
- Being based on view studies or cross-sectional studies
- Being mainly interested in STEM and pedagogy
- Being interested in 21st century skills, teaching and teacher educators, and becoming a teacher

We can see that there are many areas that are missing or only slightly studied, for instance:

- Other teacher education programs
- Quantitative data
- Other designs, such as longitudinal designs or design experiments
- Other subjects, such as practical and aesthetic or performative subjects
- Pre-service teachers' learning on campus and in schools
- Assessment on campus and in schools
- Organizational aspects of ITE

There are similarities across countries in methodological strengths – and weaknesses – as well as topics that are studied more than others. One difference is related to the prevalence of research on certain teacher education programs. It appears that Swedish researchers on ECEC teacher education have published more extensively in international journals, or possibly that ECEC teacher education is more highly emphasized in research funding possibilities. We have identified fewer studies from Denmark in general, and this may be a result of little research funding for teacher education programs. As such, the Nordic countries may have different opportunities for knowledge-based development of their teacher education programs.

We have taken a first step towards making a knowledge base accessible to teacher educators by identifying and describing 830 studies, and creating a digital database (see link: <https://www6.uis.no/Alle-UiS/ksu/6-12-2023-11-32.html>). This database can be updated in the years ahead, and can provide a constantly evolving foundation of research for teacher education.

Our standpoint is that being aware of the existing knowledge base is important. Teacher educators can search the database to find out what has been studied on teaching and learning in their subjects. They can access research results and theories to understand pre-service teachers' learning and development. They also may be able to find inspiration for their own work.

Scoping reviews are essential to be able to describe and critically assess a research field, and to investigate strengths and weaknesses. Scoping reviews can identify gaps in topics and methods. We are aware that the research included in this evidence gap

map is not exhaustive, but it might provide an indication of which areas are researched more and which less. Based on this, there is reason to believe that, for instance, “assessment” is a topic that is not studied extensively, yet assessment practices are vital elements of ITE both on campus and in partner schools. In addition to topics, there is a need to expand the use of different research designs. We have found that there are few longitudinal studies. Questions related to learning, change, development, effects, or consequences are important to address through longitudinal designs. There are also few comparative studies. Would more comparative studies provide teacher education with relevant insights into ways of developing teacher education?

The differences between the countries are interesting, and it would be intriguing to find out more about why there is less research on Danish teacher education published in English, or whether there may be specific reasons why field practice has been studied more in Norwegian ITE than in the other Nordic countries. The variations between the countries can potentially be attributed to differences in teacher education programs and the availability of research resources, including funding and research time. This scoping review can serve as an initial step towards conducting a more comprehensive analysis of possible underlying factors accounting for similarities and differences evident in international research on Nordic teacher education.

As mentioned above, scoping reviews are often conducted as a first step to investigate whether other systematic reviews are relevant. This review shows that there are areas that would be of interest to investigate further, and also possibly synthesize results across studies and across countries. There are, for instance, many studies on pre-service teachers’ development of identity as teachers, their experiences, and their perceptions. This topic would be interesting to investigate further, and to do a qualitative evidence synthesis of results. Another topic is 21st century skills: What do we know about teaching and learning within this topic in the Nordic teacher education programs?

Finally, a possible use of this scoping review and the digital database may be to initiate wider discussions about research on ITE, and to enhance collaboration on teacher education research in the Nordic countries.

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