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Knowledge brokering initiatives in education – a systematic map of the Nordic countries

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The international trend of evidence-based practice has led to the establishment of a new type of organisation, knowledge brokering initiatives, to strengthen the link between research-based knowledge and policy and practice. Policymakers in many countries, among them the Nordic countries, have increasingly paid attention in grounding decisions on the best evidence, for example, to addressing declining learning outcomes among students. Even though the Nordic countries share a long tradition of lifelong learning and valuing research in policy-making, the establishment of such initiatives in education is a relatively new phenomenon. Applying a systematic mapping approach, our purpose is to portray existing initiatives in the five Nordic countries, Denmark, Finland, Iceland, Norway and Sweden, by describing similarities and differences in their main characteristics, organisation, mandate and conceptions of knowledge and methods. In general, we find different patterns of initiatives across the Nordic countries, with the highest number and variation in Denmark, in contrast to Finland with a less varied pattern and a broader concept of evidence-informed practice. By discussing the findings in light of context differences in the link between teacher education and research, we provide some implications for further research.

Keywords: *Nordic countries; knowledge brokering initiatives; systematic map; teacher education.*

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During the last decades and at the international level, policymakers in education have increasingly paid attention to issues such as teacher accountability and measurement of student learning outcomes (e.g., Ballard & Bates, 2008; Osborn, 2006). This trend has been manifested, for example, by the implementation of international comparative tests, such as the Programme for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (e.g., OECD, 2004a; OECD, 2007; OECD, 2014; OECD/UNESCO, 2003). With the OECD and the European Union at the forefront, decision makers in education at the national level have become increasingly interested in grounding decisions on the best evidence available (Burns & Schuller, 2007; CERI, 1995).

Having its origin in Anglo-Saxon countries in the 1990s, the evidence-based practice movement in education has gradually gained ground in Nordic countries as well, for example to address the declining results in international comparative tests and to strengthen the link between teacher education and research (see Skagen, 2006). This has led to the establishment of a new type of organisation, knowledge brokering initiatives, to strengthen the link between research-based knowledge on the one hand and policy and practice on the other hand. The Danish Clearinghouse for Educational Research is an

example of such an initiative. Addressing the research and development system's lack of effectiveness in creating, collecting and disseminating knowledge that decision makers could draw on, the OECD/CERI suggested the establishment of a clearinghouse for education for Denmark (OECD, 2004b). In the meantime, similar initiatives have been established in other Nordic countries, for example, the Knowledge Center of Education in Norway and the Swedish Institute for Educational Research in Sweden.

Against the backdrop of an increase in knowledge brokering initiatives at the international level, several scholars have attempted to describe such initiatives according to their organisational characteristics, orientation in discipline, methodological approach and main conception of research-based knowledge. At the international level, Lenihan (2013) distinguished between six initiatives, namely, evidence-based practice networks, research institutes and centres, corporate research groups, foundations, national government and intergovernmental organisations and hybrid organisations. Later on, for the field of education, Prøitz (2015) used that typology in her description of different concepts and models of mapping and synthesising research-based evidence in European and Anglo-Saxon countries. For the field of social welfare Bugge, Solberg, Fridholm, and Sivertsen (2013) described national models to systematise knowledge for Norway,

Denmark and Canada according to three dimensions: relevance of research-based knowledge for policymaking, breadth of research-based knowledge and degree of interdisciplinarity.

For the Nordic countries, however, a description of knowledge brokering initiatives has been missing thus far. The five Nordic countries represent an interesting case for studying these type of organisations, as learning and education are deeply rooted in their Protestant history with a long tradition of lifelong learning (Antikainen, 2006). At the same time, the Nordic model in education can be regarded as a model that, to a certain degree, has adapted to an international trend in education policy reforms (e.g., OECD, 2015a) and thus combines long-lasting traditions and local practices with key features such as progressiveness and internationalisation (Antikainen, 2006). To provide an example, in the last five years, Finland, Iceland and Denmark have been undergoing large education reforms at the system level comprising national curricula, time allocation and teacher training. Norway and Sweden did not undergo comparable large reforms during this period. However, in both countries teacher education and training is undergoing reforms and larger educational reforms have been recommended, for Norway by national authorities (St.meld.nr. 28, 2015–2016) and for Sweden by international bodies (OECD, 2015b). Thus, in light of an increasing focus on evidence-based practice in education, the aim of this article is to map different types of knowledge brokering initiatives in education, in the five Nordic countries.

Providing the structure of the article, in the following section we define the core terms and concepts that lead the mapping process, followed by a description of the methods applied. Then we present the findings, first for each of the five countries, followed by a comparison across them, by describing the similarities and differences among them in terms of organisation, mandate and conception of knowledge and methods. In the final section, we discuss the main findings in light of country differences in linking teacher education and research, as well as providing some implications for further studies.

Core concepts and definitions

Knowledge, evidence, evidence-based practice, systematic reviews and knowledge brokering initiatives are core concepts and terms in our systematic map and thus need further clarification.

Knowledge

In general, it is possible to distinguish between different types of knowledge. For teacher education Rasmussen (2008, p. 331) distinguished between three types: first, ‘research knowledge’, being the result of the research process with its requirements on clear concepts, theoretical foundation and methodology; second, ‘praxis knowledge’,

developed by practitioners grounded in their own experience; and third, ‘professional knowledge’, developed by professionals’ reflections on how to improve practice. In our mapping, we distinguish between two types of knowledge, *research-based knowledge* and *practice-based knowledge*. Focusing on research-based knowledge, we do not further distinguish further between professional and practice-based knowledge.

Evidence

The term *evidence* is ambiguous and has several meanings, in different languages and disciplinary fields. Whereas the English term clearly relates to causality and proof, the equivalent French term has a broader meaning, including different types of knowledge other than empirical or scientific research. For the disciplinary field of education, *evidence* is often used in a broader sense, comprising systematic reviews, research results from primary studies and test results of student learning outcomes, such as PISA (Hansen & Reiper, 2011, p. 197). Scholars in medicine and healthcare, in particular, argue about the distinction between evidence and documentation in the discussion of what counts as evidence. As such, by the term *evidence* they mean knowledge produced by systematic reviews of existing research; by *documentation*, they mean other forms of research-based knowledge, such as primary studies and statistics (Lindberg, 2002). In our mapping, we will distinguish between two categories of research-based knowledge, evidence in a narrow sense and documentation.

Systematic reviews

Systematic reviews can be defined as literature reviews ‘that adhere closely to a set of scientific methods that explicitly aim to limit systematic error (bias), mainly to identify, appraise and synthesise all relevant studies (of whatever design) to answer a particular question (set of questions)’ (Petticrew & Roberts, 2006, p. 9). To qualify as a *systematic review*, the following criteria are mandatory: transparency and rigor, predefined inclusion and exclusion criteria and a systematic quality appraisal of the included studies as unit of analysis. Thus, as a stand-alone research piece with its own value, a systematic review differs from conventional reviews that do not use systematic review methods, even though these still might ‘represent excellent overviews of wider literature and concepts’ (Petticrew & Roberts, 2006, p. 40). Further, reviews might consider practice-based knowledge in addition to research-based knowledge. In our mapping, we make a rough distinction between systematic reviews and reviews as two different types of evidence in a narrow sense.

Evidence-based practice

Originally, proponents of the evidence-based policy movement made claims about the need for a better and more systematic overview, facing increasing production

of research-based knowledge, in particular in primary studies, to avoid duplication (Bohlin, 2010; Hansen & Reiper, 2011). In medicine and healthcare, the main concern has been to support decision makers to make more *use* of research-based knowledge already available, for example by conducting and disseminating systematic reviews, mostly on questions of *what works*. In education, however, stronger emphasis has been on the *absence* of research-based knowledge of high quality to enhance practice in teaching (Hargreaves, 1996). The general idea that research might improve practice draws on the assumption that research is ‘systematic and rigorous, and provides explicit evidence which can be assessed objectively [...] [in] contrast with evidence from professional experience, which is portrayed as unsystematic – reflecting the particular cases [...] and as lacking as rigour [...] not built up in an explicit, methodological way [...]’ (Hammersley, 2001, p. 2). Levinsson (2013) distinguished between two models of evidence-based practice according to different epistemological conceptions, the ‘classical model’ and the broader ‘evidence-informed model’. Whereas the former draws on a more narrow definition of *research* as science and having a focus on effectiveness, a hierarchical model of evidence with systematic reviews of randomised controlled trials at the top, the latter draws on a broader, more pluralistic understanding of evidence, including knowledge generated by researchers *and* practitioners. In general, the classical model is more dominant in the natural sciences (e.g., medicine) compared to the social sciences such as education and pedagogy, as the two disciplines differ in their paradigms, methodological approaches and degree of contextualisation. For the production of systematic reviews, however, the classical model still appears to dominate *across* disciplinary boundaries. This means that the logics of aggregative syntheses, conventional for reviewing quantitative studies are still applied for the syntheses of qualitative studies (Bohlin, 2010). According to Bohlin (2010), the first handbook for conducting systematic reviews in educational research, published in 2003, mainly draws on the classical model according to the guidelines by the Cochrane and Campbell Collaboration.

In our mapping, we seek to uncover indications of the two models, the classical and the evidence-informed model, the former with a focus on effect studies, mainly randomized controlled trials, and universal research-based knowledge (single methods); the latter with a focus on quantitative and qualitative methods (multimethods) and more contextualised knowledge.

Knowledge brokering initiatives are understood as organisations or initiatives to facilitate research-based or evidence-informed decisions (Meyer, 2010). An example in medicine is the Cochrane Collaboration, an international network established more than two decades ago that at present involves around 37,000 contributors

from over 130 countries, among them researchers *and* practitioners. In contrast to medical staff, teachers have a weaker tradition of being involved in basic research. They are trained to a lesser degree to *use* research in their practice, and to a lesser degree they actively contribute to the research agenda. In general, in education there seems to be a larger gap between research and practice (e.g., Broekkamp & van Hout-Wolters, 2007). Support for the co-production and use of research-based knowledge by policymakers and practitioners has traditionally been relatively scarce in education (Burns & Schuller, 2007). With the establishment of different types of knowledge brokering initiatives in many countries and more explicit strategies to strengthen links between research-based knowledge and policy and practice, this trend has gradually changed (see e.g., Pareja Roblin, Ormel, McKenney, Voogt, & Pieters, 2014). Prominent examples of initiatives covering the field of education are the Campbell Collaboration, an international network of volunteers similar to the Cochrane Collaboration, and the EPPI-Centre, located at the Social Science Research Unit of the Institute for Education, at the University of London. Another example on a temporary basis is the Evidence Informed Policy and Practice in Education in Europe (EIPPEE) network, which built on a previous project (2011–2013) funded by the European Commission. Its aim was to map the range of activities addressing the link between research and policy-making in education in European countries. One of the core findings of the EIPPEE project was that there were still relatively few initiatives across Europe that directly mediated between research-based knowledge and policy and practice (Gough, Tripney, Kenny, & Buk-Berge, 2011). As a ‘new layer of translators’ (Rasmussen & Holm, 2012, p. 67), knowledge brokering initiatives can be described as organisations with the aim to ‘facilitate the transfer of research and other evidence between researchers [policy-makers] and practitioners’ (Ward, House, & Hamer, 2009, p. 2) to ‘create connections between researchers and their various audiences’ (Meyer, 2010, p. 118), among them teacher educators and teachers. Thus, they are located ‘at the interface’ between two worlds, that of researchers and that of policymakers and practitioners (Ward et al., 2009, p. 2). Being translators of knowledge, they do ‘more than simply moving knowledge’ (Meyer, 2010, p. 120), aiming at bridging the gap between primary researchers as *producers* and decision makers as *users* of research-based knowledge.

Knowledge brokering initiatives can comprise three roles, that of knowledge managers by facilitating ‘creation, diffusion and use of knowledge’, that of ‘linkage agents’ to foster relations between knowledge producers and users and that of ‘capacity builders’ to facilitate access to knowledge and to provide training to users of knowledge (Ward et al., 2009, p. 2; see also Meyer, 2010; Oldham & McLean, 1997). In sum, these initiatives actively engage

in a variety of activities such as systematically retrieving, organising and synthesising different types of knowledge – mainly research-based knowledge – facilitating access to knowledge, and communicating and disseminating knowledge to different audiences, comprising policy-makers and practitioners (e.g., Prøitz, 2015) (Fig. 1).

Even though these roles are often not easy to disentangle, in our mapping, we seek to describe different types of knowledge brokering initiatives according to their focus related to the roles as knowledge managers, linking agents or capacity builders.

The literature distinguishes between different types of knowledge brokerage initiatives, for example according to degree of formalisation, organisation and range of tasks. One distinction is between *formal* or institutionalised initiatives and rather *informal* initiatives (see Burns & Schuller, 2007), for example defined as more loose networks between researchers and policymakers. This article focuses exclusively on formal knowledge brokering initiatives in education in the Nordic countries, as informal initiatives often are of temporary duration and often difficult to find. Providing a map of international institutions that aim to facilitate evidence-based policy in different fields, Lenihan (2013) distinguished between six types of knowledge brokering initiatives according to their organisational structure, all of them contributing directly to the process of linking research-based knowledge to decisions in policy and practice. In his map, he further applied descriptive categories such as size and scope of activities and methods applied. Inspired by Lenihan's typology, Levinsson's two models of evidence-based practice and different conceptions of knowledge, in particular research-based knowledge (evidence, documentation), probably supplemented by practice-based knowledge, our aim is to portray formal knowledge brokering initiatives in education in the Nordic countries.

Method: map of knowledge brokering initiatives and comparative approach

Our study combines a descriptive map for each of the five countries with a comparative approach.

Systematic mapping

The method used in this paper is a systematic retrieval and mapping of formal knowledge brokering initiatives in the five Nordic countries, Denmark, Iceland, Finland, Norway and Sweden. This process consisted of several steps including the predefinition of inclusion criteria, the systematic selection of key documents and analysis of the material.

In terms of inclusion criteria, we limited our search to formal, institutionalised knowledge brokering initiatives explicitly addressing decision makers in the field of education, among them policymakers at different levels and practitioners. Our search strategy consisted of an Internet search of relevant documents with a description of relevant initiatives in terms of their mandate, their organisation, main conceptions of knowledge and methods applied. These documents consisted of webpages and strategy documents (self-descriptions), the latter if electronically published and easily accessible.

For finding relevant documents, we retrieved the webpages of ministries and directorates in education in the five countries or, if we were already aware of them, the webpages of relevant knowledge brokering initiatives. For Denmark, Norway and Sweden we retrieved information provided in the Scandinavian languages, whereas we retrieved information in English only for Iceland and Finland. Based on the documents retrieved, the first author made a draft describing knowledge brokering initiatives for each of the five countries.

To validate the map of knowledge brokering initiatives, an information request was sent *via* e-mail to country experts in evidence-informed policy and practice in education in Sweden, Denmark, Finland and Iceland. Country experts were recruited among members of the EIPPEE network. Considered as leading experts in evidence-based policy and practice in education, their role was to review the draft document (as described above) of each country and, if necessary, to provide additional information (e.g., strategy documents). We did not request an additional country expert for Norway. The reason for this is that the first author has been actively

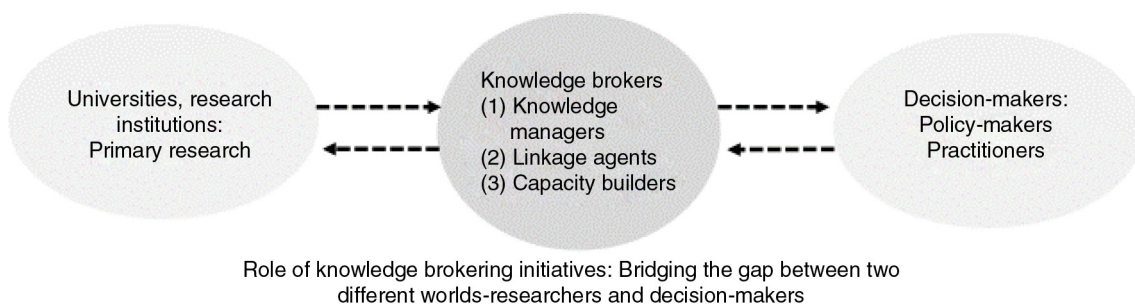


Fig. 1. The role of knowledge brokering initiatives.

engaged in the EIPPEE network, by representing one of the participating units located in Norway and as a conference participant presenting her own research. Thus, the recruitment of an additional country expert might have led to an additional information bias in favour of Norway.

For Denmark and Sweden this process did not lead to any additional documents other than those retrieved. The validation process was in particular useful for Iceland and Finland, with limited information available on knowledge brokering initiatives in English. For Iceland, we collected one additional document, including information on the New Directorate of Education. We are aware that the collection of documents for Finland and Iceland, limited to documents in English, might have negatively biased the country maps. In Appendix 1, we provide a table of documents retrieved for each country, including webpages and strategy documents with exact references.

Where we retrieved information from webpages using indirect citations, we do not explicitly refer to the exact webpage reference in the running text; where we use direct citations from webpages, we use quotation marks. For strategy documents, we use conventional references.

We have chosen a mapping approach, which is a descriptive method of data analysis, inspired by document and content analysis techniques (e.g., Robson, 2002, p. 348 ff.). This approach consisted of several tasks, iterative rather than subsequent: The first author read the included documents (web documents, strategy documents) several times, applying different reading techniques, such as screening and narrow reading. During the narrow reading process, information was coded with respect to the following categories: 1) organisation – category of knowledge brokering initiatives according to Lenihan (2013), location; 2) mandate – main role, target group; 3) conception of knowledge and methods applied – 3.1) knowledge: research-based, practice-based knowledge; type of research-based knowledge: evidence (systematic reviews, traditional reviews), documentation (primary studies, statistics); 3.2) methods: multimethods (quantitative and qualitative studies and data), single methods; orientation of evidence-based practice: classical model, evidence-informed model. This process was conducted by the first author and validated by the second author.

Comparative approach

In general, a comparative approach builds on two principles, difference and sameness. First, a comparative approach implies an *a priori* principle of difference, either ‘difference of degree’ (Marginson & Mollis, 2001, p. 6), given in unequal quantities of the same kind of object, or ‘difference of kind’ (Marginson & Mollis, 2001), contrasting objects of varying qualities. Second, a

comparative approach means both striving for *similarity* and *variation* between cases. According to Marginson and Mollis (2001), a prerequisite for a comparative approach is a commonly defined set of criteria, including the units of analyses, the elements to compare and a theoretical argument for linking the common criteria.

Our descriptive map of knowledge brokering initiatives applies a comparative approach. The units of analysis are the five Nordic countries, with a focus on the link between teacher education and research. The elements of comparison are knowledge brokering initiatives in education, both in their number (quantities) and quality – their organisation, mandate and conceptions of knowledge and methods applied. Our approach is twofold. First, we describe different types of knowledge brokering initiatives for each country, for example providing country maps of knowledge brokering initiatives; second, we compare these country maps of knowledge brokering initiatives, which means a ‘comparison across contexts’ (Steiner-Khamsi, 2013, p. 23). In our article, we focus on the link between teacher education and research, in other words knowledge construction for the teaching profession, as teachers are among the main target groups of knowledge brokering initiatives in education.

The application of a comparative approach requires a brief context description for each country, which may serve as a starting point to understand differences between them. Each description includes some general key facts about the country and its education system, such as the number of pupils and teachers, and some more specific information about the link between teacher education and research.

Country context descriptions

Denmark. Geographically the smallest country compared to the four other Nordic countries (43,092 km²), with approximately 5.5 million inhabitants, Denmark has the highest population density. Schooling is compulsory and comprehensive until the age of 16. In 2014, approximately 710,000 children were enrolled in compulsory education, including preschool (Statistics Denmark, 2015). Governance of the education system is shared between central and local authorities. While the Ministry of Education defines national priorities, the 98 municipalities are in charge of most of the educational decisions at the primary and lower secondary level (OECD 2015a, p. 215). Traditionally, the link between research, specifically research-based knowledge, and the teacher profession has been relatively weak. According to Rasmussen (2008), among the Nordic countries, Denmark is the only one ‘that does not have or is preparing to launch a research-based teacher education programme’ (p. 335). Until 2007 teacher education was located at so-called seminars, but since 2008, these are part of eight

university colleges without obligations to conduct research. *Via* 'so-called-research connections' (Rasmussen 2008) university colleges are expected to cooperate with universities (Rasmussen 2008). Described as being 'linked to research', teacher education has not been explicitly subject to university regulation or the regulations about providing research-based teacher education (Nordic Councils of Ministers, 2009).

Finland covers a total area of 338,424 km², with approximately 5.5 million inhabitants. Since 2015, schooling has been compulsory from ages 6 to 16. According to Statistics Finland, 542,900 pupils were enrolled in 2,633 primary and lower secondary schools, with 60,400 pupils in preschool. Governance of the education system is shared between central and local authorities. While the Finnish Ministry of Education defines educational priorities, the 335 municipalities maintain and support the schools and are mainly in charge of organisation of education, funding, curriculum and hiring of personal (OECD, 2015a, p. 222). In 2013, the number of teachers in compulsory education was 39,041 (Statistics Finland). In the 1970s, Finland was the first of the Nordic countries to change its teacher education to a master's level research-based degree, provided at universities and adjusted to university faculty and department structure. Teacher educators hold a master's degree and are obliged to carry out research (Afdal, 2012; Niemi, 2006; Rasmussen, 2008; see also: Eklund, 2009). Finland has had only a few main reforms of teacher education. In the last two decades, changes in the organisation and content of teacher education have been initiated primarily by academic institutions rather than national policy (Afdal, 2012).

Iceland is geographically more than twice as large as Denmark, with a surface area of 103,440 km², but it has the lowest number of inhabitants, with a population of approximately 320,000. School is compulsory and comprehensive from age 6 to 16. In 2014, 43,136 pupils were enrolled in compulsory education, with a total of 4,596 licensed teachers in compulsory education (Statistics Iceland). Governance is divided between central and local authorities. While the Ministry of Education sets the main objectives and the administrative rules, municipalities are responsible for compulsory education; individual schools are responsible for most decisions at the lower secondary level (OECD, 2015a, p. 240). By 1971, teacher education had been moved to either a university or a college; since 1997, teacher education has been formally required to be research-based. Since 2011, it has been a requirement that all new teachers and other professionally trained pedagogical staff hold a five-year master's degree; teacher training programmes strongly emphasise continuing education and quality in education for teachers (Nordic Council of Ministers, 2009; Rasmussen, 2008).

Norway covers a surface area of 323,787 km², with approximately 5.2 million inhabitants. School is compulsory and comprehensive from ages 6 to 16, and governance is shared between national authorities and 428 municipalities (OECD, 2015a, p. 274). According to Statistics Norway, in 2014 approximately 620,000 pupils were enrolled in compulsory education, that is attending 2,678 public schools and 208 private schools. In 2014/15, approximately 66,000 teachers were registered in compulsory schools (Utdanningsforbundet, 2016). As a result of the college reform, teacher education was moved to university colleges and universities, both under the same law, including the requirement for research-based education. Even though university colleges have been required to conduct research and development work since the 1970s, the recruitment of enough qualified university teachers holding a PhD is a challenge. In fact, the seminarum tradition still appears to be of significant importance (e.g., Rasmussen, 2008). To provide an example, general teacher education is strongly valued as a 'model for how teaching should be conducted in primary education and what methods prospective teachers ought to know and use as teachers in school' (Afdal, 2012, p. 14). Until 2010, teacher education targeted the education of general and multidisciplinary teachers (Afdal, 2012). During the past few years, reforms have been enacted to further professionalise teachers and stimulate their professional development (Wollscheid, 2015).

Sweden covers an area of 447,420 km² and is the largest of the Nordic countries in terms of number of inhabitants, with 9.1 million. The education system is governed by the ministry and by local authorities. While the ministry defines goals and learning outcomes, local authorities are responsible for local decisions (OECD, 2015a, p. 295). School is compulsory and comprehensive from age 7 to 16. According to the Directorate of Education, in 2014 950,000 pupils were enrolled in compulsory education and 11,400 in preschools. In the school year 2014/2015, there were 4,040 public and 800 private schools at the compulsory level. Similar to Norway and Denmark, teacher education is historically rooted in the seminarum tradition. Since the 1970s, teacher education in Sweden has been located at colleges; in 1977, the legislation of college education was aligned to that of universities. This means that by law teacher education must be research-based. At the same time, linking teacher education to research is regarded as one of the greatest challenges (e.g., Askling, 2006). Similar to Norway, current reforms address stronger professionalisation of teachers and stimulation of teachers' professional development (Wollscheid, 2015).

In sum, while the systems of compulsory education in the Nordic countries are relatively similar, there are greater differences in the organisation of teacher education (see Hopmann, 2006; Nordic Council of Ministers, 2009). With regards to the link between teacher education and

research, Finland shows the strongest link, followed by Iceland, Norway and Sweden with less history of research-based teacher education. Denmark appears to have the weakest link between teacher education and research, even though there are indications of change.

Results – mapping knowledge brokering initiatives in education

First, we provide a map of knowledge brokering initiatives for each country, in terms of their organisation, their mandate and their conception of knowledge and evidence and methods applied. Second, we compare the five Nordic countries in terms of similarities and differences with reference to the context descriptions. In general, we clearly identified three out of six types provided by Lenihan: research-institutes centres, governmental agencies and hybrids. Those initiatives that did not fit into Lenihan's typology were coded as 'others', while units belonging to international networks (SFI Campbell) were categorised under the research centres where they were localised.

Country maps of knowledge brokering initiatives

Denmark

For Denmark, we provide a map of knowledge brokering initiatives, which we grouped into research institutes/centres, governmental agencies and hybrid organisations.

Research institutes and centers

The Danish Clearinghouse for Educational Research (Danish Clearinghouse) was founded in 2006 as an independent unit at the School of Education, Aarhus University. In 2007, the School of Education merged with the Aarhus University, changing its status from an independent university to university school. Since 2011, the School of Education has been a department at the Faculty of Arts. Aarhus University has published its own strategy document on how to serve authorities, practitioners in continuing education and training and practitioners in research-based decision making (Aarhus University, 2010). As stated on the webpage, the Danish Clearinghouse for Educational Research aims at providing 'an overview of the best currently available knowledge regarding good evidence-informed educational practice and disseminates this knowledge to educational practitioners and policymakers'. Ranging from early education and childcare, to compulsory education and higher education, its main function is 'to identify, compile and disseminate the best available empirical knowledge [research-based knowledge] about various phenomena within educational theory and practice'. Producing research-based knowledge (evidence), the Danish Clearinghouse conducts and disseminates systematic reviews of different formats. This evidence might be the result of primary studies or of research and development activities, and it may stem from national or international resources.

The strategy document refers to a broader concept of evidence-based practice (evidence-informed model), that is, systematic reviews including both qualitative and quantitative studies (multimethods) and different methods of synthesis Aarhus University (2013). The core staff of the Danish Clearinghouse consists of three full-time researchers and permanent administrative staff.

Schooling and Education Unit and SFI Campbell – the Danish National Centre for Social Research. SFI is an independent research facility under the Ministry of Social Affairs. Research-based knowledge with high relevance for policy and practice (documentation) and systematic reviews (evidence) are among its core activities (SFI-Aarsrapport, 2015, p. 3). The Schooling and Education Unit and SFI Campbell belong to one of four departments. Schooling and Education conducts primary studies and evaluations (documentation) in early childcare and education applying a wide range of research questions, for example on the effect of professional development of teachers and importance of family relations for children's school achievement (multimethod), as mentioned on the webpage. SFI Campbell was established in 2002 as part of Schooling and Education, working 'with evidence and measuring of effects of social welfare interventions'. Its core objective is to improve the knowledge base to facilitate well-informed decisions in policy and practice by conducting and disseminating systematic reviews within social research. SFI Campbell mainly adheres to the guidelines of *Campbell Systematic Reviews* (see also: SFI Aarsrapport, 2015, p. 8). Campbell reviews are limited to studies on the effect of interventions, such as randomised controlled studies and studies with quasi-experimental design under certain conditions (classical model of evidence; single method); qualitative studies are not part of the included studies, but can be used for contextualisation, 'to paint a richer picture of the intervention, its effects, how or why it produces those effects [...]'. (The Campbell Collaboration, 2015, p. 11). The staff consists of 34 members comprising researchers, professors, research assistants and students.

Research Center for Early Childcare Institutions. In 2015, the centre was established at the Institute for Psychology and Education Research at Roskilde University. It is a collaboration between Roskilde University, the School of Education at Aarhus University and university colleges. Its purpose is the production and systematisation of research on early childcare (primary studies and reviews) to support research-based practice by linking researchers and practitioners and to inform the political agenda, both national and international, by the means of continuous dialogue with different stakeholder groups. The core objectives are to facilitate interaction and synergies between research, education, and training and practice, as well as to build capacity in knowledge

synthesis and dissemination as a core knowledge institution. For conceptions of knowledge, according to its self-description the Research Center includes both primary studies (documentations) and research reviews (evidence) to get an overview of existing research-based knowledge, applying multimethods, with particular focus on qualitative methods. Thus, the orientation of evidence-based practice can be understood as evidence-informed. The staff consists of 7 researchers and 14 associated educators, such as professors or lecturers.

The National Center of Reading. In 2006, the centre was established under the Danish Ministry of Education, and today it is part of the Danish University colleges, located in Copenhagen. The overall objective is to promote literacy development and to maintain a high professional level in teaching at the university colleges. Its primary aim is to transfer research-based knowledge from universities to practitioners at educational institutions. The National Center of Reading collects, produces and disseminates research-based knowledge within the fields of literacy: reading, writing and language. According to its self-presentation, among its core activities are providing reference lists and reviews, including national and international research (evidence) and research and development studies (documentation) in collaboration with professionals, universities and policymakers, and disseminating knowledge (Nationalt Videncenter for Læsning). The staff consists of 15 members, among them lecturers, researchers, administrative consultants and student assistants.

The National Center for Science Education was founded in 2007 as an independent public service organisation. It is a decentralised organisation with the steering unit located in Copenhagen and five regional centres in each region, with 15 staff members in total. One of the main core activities is knowledge collection (evidence: reviews), dissemination and distribution in collaboration with partners in education *via* arrangements and websites with the overall aim of identifying and systematising research-based knowledge and knowledge transfer to relevant target groups such as practitioners.

Governmental agency

The Resource Center for the Public School was founded in 2015 as a unit of the Ministry of Education, as part of the public school reform with the overall aim to support public schools in developing evidence-based practice. The main activities are to support the ministry in producing and disseminating research-based knowledge to authorities and schools, in collaboration with researchers and knowledge institutions and to support teaching consultants in research-based practice. The centre initiates both research reviews (evidence) and single studies (documentation), in collaboration with researchers.

Hybrid organizations

The Danish Evaluation Institute. As an independent public institute under the Ministry of Education, the Danish Evaluation Institute (EVA) was established in 1999 and today has 100 employees in total. Its mission comprises evaluations, analyses and tools that contribute to quality development in the education sector by using quantitative and qualitative methods (multimethods). Target groups include decision makers in policy at different levels and schools. Its main tasks consist of evaluations, analyses and dissemination of results (documentation and evidence, reviews), providing support to educational institutions in evaluations *via* training.

In sum, we identified eight initiatives in Denmark, which differ widely by organisational characteristics, main role and their target groups and conceptions of research-based-knowledge and methods applied. Six initiatives are classified as research institutes or centres; three of them are located at a university, while the remaining initiatives are located at a ministerial or municipal unit. For conception of knowledge and methods applied, we found three initiatives with a strong focus on evidence, two of which produce systematic reviews, but with differences in their conception of evidence-based practice and methodological focus. Established in 2002, SFI Campbell has a relatively longer history as part of the international Campbell Collaboration network, drawing on the classical model of evidence-based practice, with a focus on effectiveness studies and an aggregative approach in synthesis of studies. Established in 2006, the Danish Clearinghouse appears to draw on the broader conception of evidence-informed practice, applying multimethods. Drawing on self-reporting documents, we were not able to clearly categorise the remaining initiatives under one of the two models (Table 1).

Finland

In the following, we categorised the four knowledge brokering initiatives, according to Lenihan (2013) into research institutes and centres and governmental agencies.

Research institutions and centres

The Finnish Institute for Educational Research (FIER) has a relatively long history, founded in 1968 at the University of Jyväskylä as a multidisciplinary centre for education research. Its staff comprises 8 directors and research team leaders, 10 support staff members and more than 50 researchers. By investigating the whole range of the education system from basic education to higher education and adult learning, the research activities of FIER promote learning and give support to policymakers and practitioners (schools and teachers). In terms of the conception of knowledge, FIER 'is specialised in large-scale international comparative studies, the best known of which is PISA. [. . .] [but it also] carries out

Table 1. Map of knowledge brokering initiatives in Denmark.

Name	Organisational		Mandate		Conception of knowledge and methods applied	
	Category	Location	Main roles	Target groups	Conception of knowledge	Methods
Danish Clearinghouse	Research institute/unit	University	Managing knowledge, linkage agent	Policymakers, practitioners	Research-based knowledge: Evidence: systematic reviews	Multimethod (quantitative and qualitative) Evidence-informed model
SFI Campbell	Research institute/unit	Research sector institution	Managing knowledge, linkage agent	Policymakers, practitioners	Research-based knowledge: Evidence: systematic reviews	Single method (emphasis on effect studies) Classical model
SFI Unit Schooling and Education	Research institute/unit	Research sector institution under the Ministry of Social Affairs	Managing knowledge, linkage agent	Policymakers, practitioners	Research-based knowledge: Documentation: e.g., evaluations	Multimethod (quantitative and qualitative)
Research Center for Early Childcare Institutions	Research centre	University	Managing knowledge, linkage agent, capacity building	Policymakers, practitioners	Research-based knowledge: Documentation Evidence: research reviews	Multimethod (with emphasis on qualitative methods) Evidence-informed model
National Center of Reading	Research centre	University	Linkage agent	Practitioners at different levels	Research- and practice-based knowledge: Documentation: practice-based knowledge Evidence: research- and practice-based	Multimethod (quantitative and qualitative)
National Center for Science Education	Research centre	Part of public service, independent, decentralised	Linkage agent, capacity building	Practitioners at different levels	Research- and practice-based knowledge: Documentation	Multimethod (quantitative and qualitative)
Resource Center for the Public School	Governmental agency	Ministry	Linkage agent, capacity building	Authorities, practitioners	Research- and practice-based knowledge: Documentation: practice-based knowledge Evidence: research reviews	Multimethod (quantitative and qualitative)
EVA	Hybrid: independent public institute	Ministry	Managing knowledge, linkage agent, capacity building	Policymakers, practitioners	Research-based knowledge: documentation (e.g., evaluations); evidence (reviews)	Multimethod (quantitative and qualitative)

national and regional studies to promote learning and the functioning of individual schools', specifically producing research-based knowledge in the form of documentation (multimethods).

LUMA Centre Finland at the University of Jyväskylä was established in 2013 as an umbrella organisation for 11 LUMA centres located at Finnish Universities to strengthen and facilitate their collaboration on national and international level. One of its aims is to support the further training and professional development of teachers over the life course on all education levels and thus strengthen research-based teaching. The history of LUMA activities dates back to 1996, with the establishment of a science education development project by the Finnish National Board of Education lasting until 2002. In 2003, LUMA as Finland's Science Education Centre was established at University of Helsinki.

Center for Educational Research and Academic Development. Consisting of eight core members, the Center for Educational Research and Academic Development (CERADA) targets teachers and other researchers to develop research-based art pedagogics of high quality at the University of Helsinki and other institutions and in other contexts. In sum, CERADA is a network of teachers, researchers and other stakeholder who are interested in developing art pedagogy by international collaboration.

Governmental agency

Finnish Education Evaluation Centre. As an independent governmental agency, the Finnish Education Evaluation Centre (FINEEC) was founded in 2014 to act as a central evaluation unit related to the whole education sector on a national level by combining evaluations previously conducted by three separate institutions, the Finnish Higher Education Evaluation Council, the Finnish Education Evaluation Council and the Finnish National Board of Education. FINEEC has approximately 40 staff members, and the main office is located in Helsinki. Its main objects are to conduct evaluations within the field of education (documentation), to carry out national tests in compulsory and higher secondary education, and to support educational institutions and universities and university colleges in terms of evaluations and quality assessment and in the development of evaluations. As stated in its strategy FINEEC 'produces evidence-based evaluation information that has an impact on the development of education' (FINEEC, 2015, p. 2). According to its webpage, its 'methods will be tailored according to the objectives of the evaluation and theme to be evaluated', which indicates a multimethods orientation.

In sum, we have identified four relatively independent initiatives to strengthen the link between research-based knowledge, policy and practice. Three of them are located at the university, while the fourth is categorised as a governmental agency. The LUMA centres primarily

address practitioners, while FINEEC targets different stakeholders in education policy and administration and higher education institutions. For conception of knowledge and methods applied, all four initiatives exclusively focus on research-based knowledge, in particular documentation and multimethods. None of them, however, explicitly mentions systematic reviews (evidence) as part of their mandate. Thus, the map of knowledge brokering initiatives illustrates a broader model of evidence-informed practice in Finland, which might not necessarily be a consequence of the general international trend in evidence-based practice (see Table 2).

Iceland

For Iceland, we identified two types of knowledge brokering initiatives: research institutions and centres located at the university and intergovernmental agencies.

Research institutions and centres

Research centres. At the School of Education of the University of Iceland, there are 21 research centres related to different fields, such as early childhood education, multicultural studies, sport and health science, and higher education research. Each of them aims to promote research in their respective field by collaborating with other researchers on a national and international level and across different fields of expertise. The role of the centres is to initiate and carry out research and to disseminate and share knowledge (research-based knowledge). Among the centres' main objectives – relevant for this article – is to contribute to research-based knowledge in the respective area by sharing and disseminating knowledge, to consult and cooperate with policymakers on different levels and to give advice and other services in their respective fields.

Governmental agency

In October 2015, a new governmental institution was established, the Directorate of Education. The new directorate is responsible for the work previously carried out by two institutions: the Education Testing Institute and the National Centre for Educational Materials. Further, it will also carry out particular administrative tasks from the Ministry of Education. According to a white paper, the institution 'is expected to play an important role in providing better support services for the education system, strengthening quality assurance and assessment, collecting data on the education system, and providing evidence-based reporting' (Ministry of Education Iceland, 2014, p. 45). This might include both research-based knowledge in terms of reviews and documentation such as statistics.

Table 3 shows only two knowledge brokering initiatives in Iceland, both with a broader conception of research-based knowledge and multimethods applied. According

Table 2. Map of knowledge brokering initiatives in Finland.

Name	Organisational		Mandate		Conception of knowledge and methods applied	
	Category	Location	Main roles	Target groups	Conception of knowledge	Methods
FIER	Research centre	University	Managing knowledge	Policymakers, practitioners	Research-based knowledge: documentation; large-scale assessment studies; local and national studies	Multimethod (quantitative and qualitative)
LUMA	Research centre	University	Linkage agent, capacity building, managing knowledge	Practitioners, schools	Research-based knowledge: documentation	Multimethod (quantitative and qualitative)
CERADA	Research centre/network	University	Capacity building	Practitioners	Research-based knowledge: documentation	Multimethod (quantitative and qualitative)
FINEEC	Governmental agency	Helsinki	Managing knowledge, capacity building	Policymakers, authorities	Research-based knowledge: documentation: evaluations	Multimethod (quantitative and qualitative)

to their own descriptions, none of them exclusively focuses on the conduction and dissemination of systematic reviews. However, the newly established Directorate of Education is expected to produce both documentation and evidence (systematic reviews), according to information retrieved *via* expert correspondence.

Norway

For Norway, we identified four knowledge brokering initiatives, categorised as research centres, governmental agencies and others.

Research institutions and centres

National Centers for Education. In Norway, there are ten national centres of education and instruction, geographically spread over the whole country. These are located at universities or university colleges, within different areas such as multicultural pedagogy, second language learning in education, art and culture in education, reading instruction

and literacy, learning environment and behaviour, health, nutrition and physical education, mathematics in education, science in education, natural science in education, new Norwegian language in education (*nynorsk*) and writing instruction and writing research. The main activities of the ten centres are to be updated in the particular field, to use research and practice-based knowledge in dissemination, to provide web-based resources, coaching and training activities for teacher training institutions, and the provision of further education (see Utdanningsdirektoratet 2015). Even though the missions of the ten centres are similar, there are differences in practice in terms of working load and resources (Aamodt et al., 2014).

Governmental agencies

The Knowledge Center for Education was established in 2013 as a unit of five staff members within the Division of for Society and Health, one of four divisions of the Research Council of Norway. Funded by the Ministry of Education, its overall mission is to present and summarise

Table 3. Map of knowledge brokering initiatives in Iceland.

Name	Organisational		Mandate		Conception of knowledge and methods applied	
	Category	Location	Main roles	Target groups	Conception of knowledge	Methods
Research Centers (21)	Research centre	School of Education; University	Managing knowledge, linkage agent, capacity building	Policymakers at different levels	Research-based knowledge: Documentation: primary studies	Multimethod (quantitative and qualitative)
Directorate of Education	Governmental agency		Managing knowledge	Policymakers	Research-based knowledge: Documentation: evaluation studies Evidence: systematic reviews	Multimethod (quantitative and qualitative)

research-based knowledge, specifically the results of national and international research in the field of education, and to disseminate these research overviews by means of an easily accessible database. Core activities comprise the collection and production of systematic reviews and literature maps (evidence) of national and international literature, as well as disseminating them, also by means of more user-friendly abstracts, the identification of knowledge gaps in research and the creation of meeting places for different stakeholders such as researchers, practitioners and educational authorities. By summarising both quantitative and qualitative studies in reviews, the Knowledge Center for Education adheres to an evidence-informed model of evidence-based practice.

Others

Research programmes

The Norwegian Research Council has commissioned three different programmes with the explicit aim of strengthening the link between research and practice. Addressing practice in educational research, the programme PRAKUT (2010–2014) built on the previous programme Research and Development and Practice (PraksisFoU) (2005–2010), with the overall aim of contributing research-based knowledge of particular relevance for practitioners in education, to increase the quality of early education and care, compulsory education and teacher training. A further aim of PRAKUT was to contribute to knowledge transfer to practitioners to strengthen the relation between teacher training and practice; as such, research funded by PRAKUT took its starting point in the praxis field applying a high diversity of theory and methods (Kunnskapsdepartementet, 2009), namely multimethods. As such, research funded by the two programmes might include elements of practice-based knowledge, in addition to research-based knowledge (documentation). An evaluation concluded that there was a high variation of knowledge dissemination forms, addressing many different target groups (Spord Borgen, Opheim, & Prøitz, 2009).

Web portals

The largest trade union for teachers in Norway, the Union of Education Norway, is in charge of the web portal *utdanningsforskning.no*, which provides its members easy access to research-based knowledge across different disciplines with the aim of strengthening research-based practice. Among the research-based knowledge that is disseminated are single studies (documentation) and systematic reviews (evidence), with methods that are not limited to one single method.

In sum, the four initiatives in Norway differ both in terms of their organisational structure and their conception of knowledge and methods applied. As a governmental agency, the Knowledge Center for Education concentrates on the production and dissemination of

systematic reviews (evidence) drawing on multimethods and can thus be described as such an initiative in a narrow sense, with similarities to comparable institutions in Sweden and Denmark (Danish Clearinghouse). The National Centers for Education and the web portal on education mainly target practitioners, the former applying a conception of knowledge that considers practice-based knowledge in addition to research-based knowledge (Table 4).

Sweden

For Sweden, we identified three knowledge brokering initiatives, one categorised as research institution or centre and two as governmental agencies.

Research institutions and centres

The National Centers of Education are located at different universities and related to five different subjects: mathematics, chemistry, physics, biology and biotechnology, and science in school. In sum, their overall aim is to support teachers within different subjects with lesson planning and design and to provide teachers with relevant research literature (research-based knowledge). By recommendation of the Swedish National Agency of Education, a new centre of didactics for natural and technical science is to be established at Linköping University, with the overall aim of stimulating research (documentation: primary studies) within the field of natural science and disseminating its results.

Governmental agencies

The National Office of Research-Based Knowledge was established in 2008 as a unit at the Swedish National Agency of Education. It has an important role as a brokering initiative between research, policy development and practice. In its role, the Swedish National Agency of Education can inform research and provide recommendations based on research-based knowledge grounded in educational law. Its mission comprises the synthesis and dissemination of research findings to practitioners, school leaders and teachers as the main target groups. The National Office of Research-Based Knowledge transfers and disseminates three different types of research-based knowledge: websites, research overviews (reviews) and research-informed development activities. Reviews combine research-based and practice-based knowledge.

Swedish Institute for Educational Research. As a new governmental agency and grounded by a large research project commissioned by the Swedish *Vetenskaprådet* (Levinsson, 2015; Prøitz, 2015), this institute was established in 2015 as a governmental agency. It is located in Solna in the county of Stockholm and has 11 staff members. Its mission is to provide support in planning, implementation and evaluation of teaching and learning activities based on research-based methods and practice.

Table 4. Map of knowledge brokering initiatives in Norway.

Name	Organisational		Mandate		Conception of knowledge and methods applied	
	Category	Location	Main roles	Target groups	Conception of knowledge	Methods
National Centers of Education	Research centre	University	Managing knowledge, capacity building	Practitioners	Research- and practice-based knowledge: documentation (e.g., statistics, evaluation)	Multimethod (quantitative and qualitative)
Knowledge Center for Education	Governmental agency	Governmental agency	Managing knowledge, capacity building	Policymakers, practitioners	Research-based knowledge: evidence: systematic reviews, reviews	Multimethod (quantitative and qualitative) Evidence-informed model
Research Programme	Other	Governmental agency	Managing knowledge, linkage agent	Teacher educators, practitioners	Research-based knowledge: documentation	Multimethod (quantitative and qualitative)
Web portal: Utdanning	Other	Provided by teacher's union	Capacity building	Practitioners	Research-based knowledge: documentation, evidence: systematic reviews	Multimethod (quantitative and qualitative)

Its main activities comprise quality assessment of research results, dissemination of research-based knowledge to practitioners and conducting systematic reviews. According to the description in its mandate, systematic reviews might include quantitative and qualitative studies and triangulation of methods (multimethods). The Swedish Institute for Educational Research disseminates its findings in a user-friendly way, providing access to research-based knowledge through electronic databases, the identification of knowledge gaps and commissioning research (documentation) that is relevant for practitioners, and where there is a lack of relevant research. Table 5 shows that two of the three initiatives share important similarities. Both are knowledge brokering initiatives in a narrow sense, producing evidence in the form of (systematic) reviews, organised as governmental agencies.

In sum, for Sweden we have identified three knowledge brokering initiatives, two of which focus on the production of evidence (systematic reviews and reviews) and dissemination of research-based findings to practitioners and policymakers.

Comparative country description

In this section, we provide a comparison across the Nordic countries to identify the most important similarities and differences between the map of knowledge brokering initiatives.

For Denmark, we found the largest number of and variation in formal knowledge brokering initiatives in terms of organisation and conception of knowledge and methods applied. For Finland, we found four initiatives, which were relatively homogeneous in terms of organisation (e.g., three are located at a university) and conceptions of research-based knowledge and methods.

None of the Finnish initiatives explicitly mentioned the production and dissemination of systematic reviews (evidence) in its mandate, in contrast to two of their Danish counterparts, which have a clear focus on systematic reviews. The Finnish initiatives appear to apply a broader concept of evidence-informed practice and the production of different kind of documentation. The production and dissemination of systematic reviews (evidence) in education was not explicitly mentioned, neither in the documents retrieved nor by our country expert. At the same time, two of the Finnish initiatives have a relatively long history dating back to the 1970s, thus not corresponding to the temporal trend of evidence-based practice of the remaining countries in the 21st century (Table 6).

Differences across the Nordic countries according to the link between teacher profession and research used might help to understand differences in country maps of knowledge brokering initiatives. In contrast to the Scandinavian countries and Iceland with a stronger seminarum tradition in teacher education and thus a stronger focus on practice-based knowledge, Finland has a strong tradition in grounding teacher education on research-based knowledge, as well as high teacher involvement in carrying out research (e.g., Afdal, 2012, Rasmussen, 2008). Consequently, Finnish teachers might not need those initiatives to help them to bridge the gap between research and practice, to the same degree as their counterparts in the remaining countries with a weaker tradition.

In comparing Norway, Sweden and Denmark, for Denmark we identified both the largest number, the widest variation and longest history of knowledge brokering initiatives in education. In Denmark the evidence-informed

Table 5. Map of knowledge brokering initiatives in Sweden.

Name	Organisational		Mandate		Conception of knowledge and methods applied	
	Category	Location	Main roles	Target groups	Conception of knowledge	Methods
National Centers of Education	Research centre (governmental)	University	Capacity building, knowledge management	Practitioners	Research-based knowledge: documentation	Methods not specified
National Office of Research-Based Knowledge	Governmental agency	Swedish National Agency for Education	Knowledge management, capacity building	Practitioners	Research- and practice-based knowledge: evidence: reviews including research and practice-based knowledge	Multimethod (quantitative and qualitative)
Swedish Institute for Educational Research	Governmental agency	Separate unit	Knowledge management, capacity building	Practitioners, policymakers	Research-based knowledge: evidence: systematic reviews	Multimethod (quantitative and qualitative) Evidence-informed model

and classical models of evidence-based practice appear to coexist. There are indications that the map of knowledge brokering initiatives appears to be influenced by international policy trends and the classical model of evidence-based practice to a higher degree, compared to Norway and Sweden, which have stronger national influences. As a reminder, the establishment of the Danish Clearinghouse was a direct consequence of the OECD's recommendations of the country review on the R&D system. At the same time, compared to the remaining four countries, teacher education in Denmark appears to have the weakest tradition and the shortest history of being research-based (Nordic Council of Ministers, 2009). Until 2007, teacher education in Denmark was still placed in seminarums (Rasmussen, 2008). At the same time, the classical model of evidence-based practice in education with a more narrow focus on effect studies, in particular randomised controlled trials, appears to be more prominent in Denmark, compared to the remaining Nordic countries.

For Norway and Sweden, however, we observed clear indications of the dominance of the evidence-informed

model in education, combining different methods (multimethods) in systematic reviews. Two initiatives similar to the Danish Clearinghouse, with respect to the conception of knowledge and methods, were established in Norway and Sweden in 2013 and 2015, respectively. Both initiatives include quantitative and qualitative studies in systematic reviews and apply multimethods by using an evidence-informed approach, but they are categorised as governmental agencies, instead of research units located at the university. At the same time, both countries have recently initiated broad reforms of teacher education and training at the national level, purposing a stronger professionalisation of teachers in line with stricter entrance criteria for teacher students and longer, more extensive study programmes (Wollscheid, 2015).

Conclusions and implications for further research

The overall aim of this study was to gather information on existing knowledge brokering initiatives in education in the five Nordic countries and to portray them in terms of their organisation, their mandate and their conception

Table 6. Comparative map of knowledge brokering initiatives in the Nordic countries.

Country/number	Organisation	Conception of research-based knowledge	Conception of methods
Denmark (8)	Several models	Evidence Documentation	Multimethod; single-method with emphasis on effect studies Classical and evidence-informed model
Finland (4)	Few models	Documentation	Multimethod
Iceland (2)	Few models	Documentation	Multimethod
Norway (4)	Few models	Evidence Documentation	Multimethod Evidence-informed model
Sweden (3)	Few models	Evidence Documentation	Multimethod Evidence-informed model

of knowledge and methods applied, by means of comparing the five country maps.

First, we identified variety between countries in the number and different types of knowledge brokering initiatives, according to their organisation, mandate and conceptions of knowledge and methods applied.

Second, our cross-country comparison revealed the largest number and broadest variation of knowledge brokering initiatives in education for Denmark, which has a comparatively long history of evidence-based practice in education and respective initiatives of knowledge brokers. Sweden and Norway show a similar number and pattern of initiatives, drawing on the evidence-informed model. For Finland, however, the initiatives we found have a relatively long history but were different in organisation and conception of research-based knowledge, in particular not defining systematic reviews as part of their mandate.

The pictures of Finland and the other Nordic countries might reflect differences in links between the teacher profession and research, in other words the difference between a stronger research-based teacher profession in Finland and a longer tradition of seminarum teacher education in the other countries. While teachers in Finland are involved in research-activities to a higher degree, there might be a stronger need to collect, systematise and disseminate research-based knowledge to teachers as practitioners in countries with a weaker link to research.

One limitation of our study concerns differentiation according to three different roles, as knowledge managers, linking agents or capacity builders. Drawing on a limited number of documents, mainly the organisations' own descriptions, the three roles were difficult to disentangle.

Further, for the methods used in the research reviews, document analysis of self-descriptions provided on web-pages and strategy documents might reveal a different picture than an analysis of the actual output, that is, published reviews. As many knowledge brokering initiatives with particular focus on the production and dissemination of systematic reviews have a relatively short history, we did not include output documents in our document analyses. Further studies in the future might explore discrepancies between self-descriptions and publications, combining different methods such as document analysis and expert and user interviews.

The strength of our article, however, lies in its descriptive and analytic map of knowledge brokering initiatives according to characteristics such as organisation, mandate and target groups, as well as conceptions of knowledge and methods applied.

Many of the knowledge brokering initiatives have a relatively short history and data on their actual use among policymakers and practitioners are scarce, with few exceptions. Evaluations up to now have revealed rather weak links between knowledge brokering initiatives and practitioners such as teacher educators and

teachers. An evaluation of the National Centers of Education in Norway (Aamodt et al., 2014) concluded that schools use them to a higher degree than early childcare institutions. Thus, studies in the nearer future might address their actual use and motivations for their use by policymakers and practitioners.

Finally, it is important to keep in mind that the orientation towards a particular model of evidence-based practice, for example, the classical model of evidence with a strong orientation on effect studies, might have implications for policy implementation and practice.

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Appendix 1

Table 1. Documents used for the description of knowledge brokering initiatives of each country.

Country	Knowledge brokering agency	Category of document: source
Denmark	Danish Clearinghouse for Educational Research, School of Education, Aarhus University	Webpage: www.edu.au.dk/en/research/research-areas/danish-clearinghouse-for-educational-research/ Strategy documents: Aarhus University (2013). Dansk Clearinghouse for Uddannelsesforskning Konceptnotat juni 2013. Aarhus: Aarhus University. Aarhus University (2010). Kvalitetssikring av den forskningsbaserende myndighetsrådgivning ved Aarhus Universitet. Aarhus: Aarhus University.
	SFI Unit Schooling and Education and SFI Campbell	Webpage: www.sfi-campbell.dk/ SFI (2015). SFI. Det nasjonale forskningscenter for velfærd. Årsrapport 2014. [SFI 2015. Annual report]. København: SFI. Strategy document: The Campbell Collaboration (2015): Campbell Collaboration Systematic Reviews: Policies and Guidelines.
	Research Center for Early Childcare Institutions	Webpage: www.ruc.dk/en/research/search-research-centers/cedif/om-centeret/
	The National Center of Reading	Webpage: www.videnomlaesning.dk/ Strategy document: Nationalt Videncenter for Læsning. Presentasjon av Centret. www.videnomlaesning.dk/media/1913/indsatsomraader-2016.pdf
	The Resource Center for the Public School	Webpage: www.uvm.dk/Uddannelser/Folkeskolen/Viden-og-kompetencer/Ressourcecenter-for-folkeskolen
	The Danish Evaluation Institute	Webpage: www.eva.dk/om-eva/strategi
	The National Center for Science Education	Webpage: www.astra.dk/
Finland	Finnish Institute for Educational Research, University of Jyväskylä LUMA Centre	Strategy document: https://ktl.jyu.fi/intranet/julkaisu-ja-viestinta/esittelo-ja-esita-1/materiaali/FIERATAGLANCE.pdf Webpage: www.luma.fi/centre/ www.luma.fi/lumat-en/
	Center for Educational Research and Academic Development	Webpage: www.uniarts.fi/en/cerada
	Finnish Education Evaluation Centre	Webpage: http://karvi.fi/en/fineec/ Strategy document: FINEEC (2015). Foresight and effective evaluation 2020. The strategy of Finnish Education Evaluation Centre. Helsinki.

Table I (Continued)

Country	Knowledge brokering agency	Category of document: source
Iceland	Research Centres New Directorate of Education	Webpage: http://menntavisindastofnun.hi.is/node/655 Strategy document: Ministry of Education Iceland (2014). White paper on education reform.
Norway	National Centers of Education The Knowledge Center of Education Research programmes – PRAKUT and PraxisFoU	Webpage: www.udir.no/Stottemeny/Om-direktoratet/Organisasjon/Nasjonalesentre/Strategy document: Utdanningsdirektoratet (2015). Oppdragsbrev til de nasjonale sentrene for 2015. Webpage: www.forskningsradet.no/prognett-kunnskapscenter/KSU/1247146831358?lang=no Webpage: www.forskningsradet.no/prognett-praksisfou/Om_PRAKUT/1224697992334 Strategy documents: Kunnskapsdepartement (2009). Oppdragsbrev. Nytt program for praksisrettet FoU i barnehage, grunnsoppl�ring og l�rerutdanning. 17.11.2009. Forskningsr�det. Praksisrettet FoU i grunnsoppl�ring og l�rerutdanning (2006 – 2009) Programplan.
Sweden	Educational research – learning portal National Centers of Education The Swedish National Agency for Education, National Office of Research-Based Knowledge Swedish Institute for Educational Research	Webpage: www.utdanningsforskning.no/ Webpages: e.g. www.liu.se/cetis/english/index_eng.shtml www.bioresurs.uu.se/aboutus.cfm Webpage: www.skolverket.se/skolutveckling/forskning Webpage: http://skolfi.se/