



The Knowledge Nexus in Teacher Qualification: Education Research and Norwegian General Teacher Education 1970–2020—Institutional and Intellectual Interchanges

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Abstract

Research in teacher education institutions has undergone a rapid dual process of expansion and differentiation over the past decades. A major effort in this article is to register and discuss key institutional and intellectual changes in education research linked to the case of Norway. This overview gives a background for discussion of the impacts from the growing research in teacher education units regarding the knowledge dynamics in general teacher education.

In the wake of the less segmented research policies of the last quarter of a century, emphasis on direct contributions of research to the qualification of teachers has become a highly visible issue. I will argue that with the concurrent expansion and diversification of education research, it has become vital to understand how the internal hybrid knowledge dynamics can support the quest for greater coherence in the qualification and professional repertoire of new teachers. Simultaneously, awareness of how research-driven knowledge specialisation can increase academic drift, fragmentation and professional disorientation in teacher education programmes is needed.

In the mapping of research trajectories in the field of general teacher education, the contrasts between epistemic patterns in the didactic phase of secondary disciplinarianisation are compared to the educational phase. Awareness across teacher education faculty of such research-driven changes can support receptivity towards disciplinary as well as cross-disciplinary challenges and of scholarly care for a more thorough and balanced professional knowledge base. Such common professional orientations can also support the cultivation of interchanges between research, teaching and innovation, and within and across arenas and disciplines contributing to the qualification of good teachers.

Keywords: history of education research, pedagogy, subject didactics, teacher education, Norway

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Today: Teacher education includes education research

This article focuses on the rapid expansion of research in the field of teacher education in Norway. Today's decentred research landscape in teacher education is radically different from earlier forms of professional knowledge packages, in Norway and elsewhere, first and foremost by the discipline of education. In the Norwegian case, this hybrid inclusion of research as a professional epistemic virtue for the education of teachers represents a counter position to earlier traditions.

As will be seen, the professional research base that teacher education candidates meet today represents a landscape of research and scholarship far more varied than earlier ones that had the discipline of education as a core. From an epistemic perspective, the recent research mix implies that most academic faculties, as well as new additions like sports science and artistic research, should be approached on equal footing in the mapping and tuning of education research on and for teaching.

For some decades, historic studies of patterns of research on and in education and of a growing educational research system have been a valuable sub-area, seen not least from special issues² in international journals. Scholarly knowledge trajectories in education as reflected by these historical and comparative studies represent diachronic counterpoints to very visible presentism in current education research policies. Within this more historical turn, however, the discipline of education, has too often had an organizing role in the discussions of pros and cons of a more recent expansion of education research. Thus, the following case is an attempt to sketch a background for discussions of current research patterns that is less dependent on earlier patterns and historic classifications.

First, an overview of the case is provided, including major reforms in higher education, development of national curriculum guidelines for the qualification of general teachers and the growth of research in mass higher education institutions, all starting about 1970. A short synopsis of major national reforms in higher education, in general teacher education and in research policy, is attached in a table as Appendix A. Next, the mapping of education research from the perspective of the teaching profession is presented. A closely related concern is to further the understandings of the impacts of the overall institutional and epistemic changes in general teacher education. With this mapping exercise as a background, the last part discusses forms of practical synthesis in relation to research dynamics and forces of fragmentation or coherence in the qualification of new teachers. This part also discusses two strategic keywords, *knowledge triangle* and *knowledge nexus*, and the possible contributions from such orientations to counter the fallacies of compartmentalisation and research-driven specialisations in general teacher education. In the quest for a varied, research-based and well-tempered qualification of new teachers, valuable strategic orientations should bridge disciplines and specialisations and support receptivity

² Secondary disciplinarianism is highlighted in the analysis by Hofstetter (2012) with references to special issues edited by Drewek and Lüth, 1998, EERJ 2001/1, EERJ 2011/3–4, and Paedagogica Historica 2009/4–5. A later special issue is EERJ 2019/5. Contrasts between subject didactics and discipline of education as forms of secondary disciplinarianism are discussed in the last part of this article.

across subjects and sub-fields for shared knowledge interests in the qualification of future generations of teachers.

Before 1970: Teacher education outside the research system

No more than half a century ago,³ the main route to the teaching profession in Norway and elsewhere in the Nordic region was through two years of further education in a small teacher education seminar or college. Within the common public schooling, the folk-school teacher was the ideal type of popular intellectual counterpart to the academic grammar school lecturer. Accordingly, the qualifications offered from the teacher seminars were framed within the strong tradition of enlightenment. These small institutions celebrated the heritage of democratic modernisation and enlightenment from below with cultural roots in diverse popular social movements.⁴ Historically, recruitment patterns to the teacher colleges reflected the connections to the folk school and non-academic secondary schools, including the examination-free folk high schools. Scandinavian research on this enlightenment has pointed to the seminal roles of many folk-school teachers as organic intellectuals of popular social movements, and small teacher colleges as important formative and public arenas. Based on research regarding this non-university teacher education, Kvalbein (2002) introduced the notion of a *seminar contract* (Rasmussen, in Hudson & Zgaga, 2008), which represented a given formative and pedagogic pattern for the qualification of classroom teachers, where an academic research ethos would have been a deviation from the formative agenda. With the rapid expansion of research inside teacher education, the inclusion of research as a key virtue in the education of teachers that represents an epistemic rupture with the seminar tradition.

The policy background for the inclusion of basic research funding and later research-driven changes is exposed by the mapping of major trends in the overall field of education research in Norway⁵ for over a half century. For the last decades, the intertwined expansion and hybridisation of education research have been a feature internationally and a driver of institutional and epistemic changes documented and discussed in several books and special journal issues (Furlong & Lawn, 2011; Hofstetter, 2012; Terhart, 2016). Recurrent comparative features discussed include the great variation in historic traditions and intellectual styles and their imprint on education research, nationally but also cross-nationally. A frequent theme has also been trajectories of disciplinarisation. Models, or

³ Two phases of a quarter of a century can frame the key institutional changes, as indicated by the turn of agendas for institutional dynamics from 1970 and again from 1995.

⁴ Skirbekk (2018) discusses the contribution of people's enlightenment and social movements in Scandinavian processes of modernization.

⁵ This contribution builds on two partly related sources: local innovation in a teacher education programme to orchestrate collaborative tasks across disciplines (Jarning, 2012), and historical studies on education research and teacher education in Norway and in Europe (Hofstetter, 2012; Furlong & Lawn 2011; Kvernbekk & Jarning, 2019; Terhart, 2016). Major institutional changes from 1960 are condensed in Appendix A.

lack of models, in the discipline of education have often had a privileged position in valuations of the pros and cons of the contemporary state of education research.

In this article, however, the rise of research in teacher education institutions is foregrounded, and today's research is mapped from the professional perspective. This turnaround of a mapping attempt has empirical as well as general and epistemic implications. Since 1970, the expansion of research and the related changing scientific and scholarly patterns in the education of general teachers was closely connected to the introduction of a binary⁶ divide with regard to research funding for the expanding mass higher education sector. From the 1990s and onwards, the knowledge landscape in higher education changed with the softening of the binary system. In the overall field of education research in Norway, units with teacher education responsibilities have had the most rapid growth. A raising intellectual continent in this expansion is what within Nordic and continental educational traditions is known as subject didactics. A related intellectual turn can be seen in the decline of the discipline of education as an obvious frame of reference in today's much wider field of education research.

Education research from 1970: Mostly the discipline of education and sectoral research

Starting from the main focus on the discipline of education (*pedagogikk*) in the 1950s and 1960s, scientific and scholarly expertise from the turn to the 1970s was extended to include sectoral research on schools and pedagogy (*skoleforskning*) by means of applied educational and social research. A psychological-pedagogic research programme had historically represented a first 20th-century form (Hofstetter, 2012) of a modern scientific knowledge base for the discipline of education, including the education of folk school teachers. Educational psychology was foremost, and pedagogies and teacher skills were, in line with professional common sense and post-war linear research policies, seen as the practical application of sound theory. In Norway, this psychological-pedagogic programme (Jarning, 2016) maintained its dominant position throughout the 1960s.

From 1970, an increase in multidisciplinary can be seen inside the discipline of education and in sectoral research. In education research, the early dominance from the discipline of education was first challenged by sectoral research and contributions from other social sciences. During the same years, the discipline of education gradually included research beyond the earlier core of psychological and methodical subfields. A 1986 report from the scientific sub-group on education in the academic Research Council marked and summed up⁷ this change from a narrow profile, with educational psychology as the axial

⁶ The binary system and beyond in the Nordic region is discussed in Jarning (2019, p. 117, 137–39), see also Cowen (2004).

⁷ The words referred are: "I løpet av de siste 10–15 årene har norsk pedagogikk endret karakter. Mens den i den første etterkrigstiden hadde en klar, men forholdsvis snever profil, er den i dag preget av bredde og mangfold. Først og fremst skyldes dette at fagmiljøene er blitt så mange flere, og at disse fikk utvikle seg i

dimension to a broad discipline of education with its internal multidisciplinary.

However, from the 1980s, sectoral research on education widened the scope beyond basic and secondary schools, as marked from 1987 with a more general label.⁸ Hybridisation in education research in this second phase accelerated through contributions from school subject specialists. The gradual inclusion of humanists and scientists in education research also widened the research base and competence areas of professional training, as seen not least in approaches to research on literacy and numeracy. With the entrance of scholars from the sciences and the humanities, the intellectual tribes in education research could no longer lean on the repertoire of mainstream social science as the obvious least common multiple. Science didacticians have also been the main participants in the large-scale international comparisons that Norway has been part of since the 1980s, and nationally, become pioneers in the big science genres of education research.

From the first half of the 1990s, the removal of the epistemic iron curtain represented by the binary system, contributed extensively to the expansion and diversification of education research. Key institutional changes include the merger of 96 separate colleges into 26 university colleges from 1993 and the introduction of one comprehensive national law for all public higher education from 1995. Overall research changes can be followed in academic as well as in professional fields through the multidisciplinary expansion of research and scholarship far beyond earlier patterns.

The institutional and epistemic expansion of education research over the 25 years after 1970 is expressed as a highly mixed field of research, in Norwegian termed educational sciences and scholarship (*utdanningsvitenskap*) and education research⁹ (*utdanningsforskning*). This polycentric field includes responsibilities for teacher qualification and other educational professions, for disciplines and newer sub- or interdisciplinary fields, and sectoral research and interaction with policy arenas and national and sub-national agencies. The term educational sciences and scholarship, pointing to interlinked scientific, scholarly and professional responsibilities in education, was coined in 1996 as a term for the then-new Faculty of Educational Sciences at the University of Oslo. Nationally, the term has become quite common in academic and professional degrees and doctoral programmes. The term education research has gradually become key in research strategies and governance, and from 2007, in the framework for bi-annual research overviews and in sectoral research policy strategies.

en periode da debatten om faget gikk som livligst. Men heller ikke de tradisjonelle fagmiljøene har beholdt sin fagprofil uendret” (Vislie, 1986, p. 14).

⁸ School research (*Skoleforskning*) was exchanged with education research (*Utdanningsforskning*).

⁹ *Utdanning* literally translates as schooling. *Vitenskap* is the term in Scandinavian languages similar to *Wissenschaft* in German and commonly translated to international English as science and scholarship. *Forskning* is the term for research.

From 1995: Research across the many disciplines in teacher education

Changes in policy doctrines and related transformations of institutional and funding patterns can be followed more directly over the 25-year period from 1995. From 1997, the university college sector was included in national research statistics and gradually also in the surveys of education research in Norway. In this part, selected information from research statistics and national surveys and evaluations is combined to map research changes. A limitation in this respect is that in overviews of education research, registration by disciplines and by teacher education units have been used only occasionally.

The extension of a research mandate to university colleges is at an early stage seen from the registration of qualified personnel in education research. An evaluation of educational research by the national research council from 2002 showed the inclusion of teacher education institutions five years earlier through the increase in the number of researchers in the field, but provided no commentary. In 1985, 82 researchers with a research degree in education were employed in universities and 16 in other institutions of higher education. In 1999, the total number of research personnel was 972; more than two-thirds of them were involved in teacher education, while 481 had doctoral degrees. In 2015, the registered research personnel had grown to 2914, and 1753 of them were employed in colleges (Gunnes et al., 2017). The same year, the education research expenditure in units that include teacher education was NOK 928 million, and two-thirds of the research was connected to teacher education units.

The rise of subject didactics: Multidisciplinarity beyond the social sciences

With the growing presence of research on school subjects and subject didactics, from the 1980s, the social sciences could no longer embrace the field epistemically, as seen not least from historical accounts on science didactics (Sjøberg, 2012) and mother tongue didactics (Ongstad, 2012; Holmberg et al., 2019). In the Norwegian case, such changes can partly be followed through registrations of the growing number of education researchers with their qualifications from faculties other than the social sciences, including the discipline of education.

In 2005, personnel in units with education research having degrees in social sciences and education, accounted for 61% of all researchers, while 16% had degrees in humanist disciplines and 13% in science disciplines. In university colleges, 34% had degrees in social sciences including education, 19% in humanities, 14% in science and 28% from other fields. Ten years later, a national report on education research in Norway (Gunnes et al., 2017) documented the varying profile of education research in 2015 in the three large subsectors: universities, university colleges and other research institutes. In 2015, the three key areas of educational sciences—the discipline of education, special education, and subject didactics—represented more than 80% of all research on education in the universities and almost 80% in the state colleges, but only 20% in the institute sector

(Gunnes et al., 2017, p. 87). In the same report, subject didactics was the largest sub-area of education research in the university colleges, at that time, the home of most of the units responsible for general teacher education programmes. This position of subject didactics in university colleges is a key indicator of how education research close to teacher education included issues centred around school subjects.

The same overview of education research from 2015 included information on the research and development (R&D) expenditures in university colleges and universities that supplemented the picture of the widened range of disciplines involved in teacher education research. In the colleges in 2015, subject didactics represented about 60% and education as a discipline about 40% of education research expenditures. Thus, the field as a whole had lost the earlier dominant position of the discipline of education, and a far wider range of scholarly qualifications in education research was visible. In addition, the formerly clear-cut divisions between discipline-oriented and professionally-oriented research had blurred.

During the last decades, a review of the literature on subject didactics in Scandinavia reveals examples of the maturation of this new array of subfields. A recent example is an article, “On the Emergence of the L1 Research Field” by Holmberg et al. (2019), which investigated patterns of research in mother tongue (L1) didactics over the last two decades and concluded that “L1 research is characterized as a professionalized region (Bernstein, 2003) with strong didactization (Ongstad, 2004) and a potential for powerful disciplinary knowledge (Lambert, 2017)” (Holmberg et al, 2019, p. 1). A general pattern seems to be that the L1 research field shows a very rapid expansion with about three-quarters of the registered dissertations delivered in the last decade. The article also explores two main rationales for research in the field; the most prominent is to investigate the current features of L1 and the learning and teaching in the framing of the subject. A second main rationale is centred on classroom interaction and the dialogic construction and negotiation on didactical meaning.

Rapid increase of publication counts in education research

The national counting of scientific publications was introduced in 2005 as a tool for monitoring and partly for the financing of research activities in the higher education sector. One of the bi-annual reports on education research in Norway (Gunnes et al., 2013) included a separate chapter on publication patterns. Two features stood out: the doubling of overall national publication points in education research between 2005 and 2013 and a more than tripling of publication points in the same years in university colleges.

Table 1. Publication points in education research, 2005–2013

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Universities	319.9	278.1	376.4	392.8	398.4	481.7	563.2	540.7	505.3
Univ. colleges	118.7	70.5	184.8	195.5	330.6	358.7	298.0	443.5	393.9

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Other	18.9	22.5	45.1	51.7	67.8	93.8	110.8	113.8	176.0
All	457.6	371.2	606.2	640.1	796.8	934.1	972.1	1098	1075.2

Note. After NIFU (Gunnes et al., 2013, Table 4.3, p. 46)

From 1990, a frequent critical comment about the state of research nationally concerned the weak outcome of R&D in state colleges. One decade later, publication patterns have become less diverse.

Training of researchers —PhD reform and supplementary track

From the 1970s, the science faculties in Norwegian universities slowly began to introduce organised research training and PhD degrees. In humanities, social sciences and education, this third-degree level was firmly established by 1990. In the broad field of education research, the discipline of education was the intellectual home of PhD programmes, at least up until a decade ago. With the national adoption of the Bologna framework from 2003, professionally-oriented PhD programmes¹⁰ and programmes in subject didactics have gradually been accredited. Such programmes supplement the discipline of education as a deliverer of PhD candidates in educational sciences. Since 2010, many institutions and their education PhD programmes have collaborated with the Norwegian National Research School in Teacher Education (NAFOL), which is a sectoral national research school supporting qualification of researchers in the field of education with a professional orientation, that is, for pre-school, primary and secondary schools, and teacher education. NAFOL is funded by the National Research Council from 2010 through 2021¹¹ and has been organised as a partnership of most universities and university colleges in Norway with teacher education programmes.

Education research beyond the social sciences

The leaps seen in the number of registered research faculty and in number of publications over the past few years indicate an expansion of research with contributions to the professional qualification of teachers as a major rationale.

- In 1985, a decade before the removal of the binary system, 101 researchers in education were registered, mostly in the universities and 16 in colleges. By 1999, the

¹⁰ Examples with year and current title in Norwegian include: *Matematikdidaktikk* (2002, HiA/UiA), *Utdanningsvitenskap—Spesialpedagogikk* (2003, HiS/UiS), *Lesevitenskap* (2007, UiS), *Utdanningsvitenskap for lærerutdanning* (2012, HiOA/Oslo Met), *Pedagogiske ressurser og læreprosesser i barnehage og skole* (2012, HBV/USN), *Profesjonsrettede lærerutdanningsfag* (2012, HiHm/HINN).

¹¹ In the national R&D statistics, educational science, *utdanningsvitenskap*, is not yet included, and registration of graduates from doctoral programmes in educational sciences, and inside and outside the discipline of education, does not yet exist. However, in a recent report, 305 PhD candidates from the faculty of educational sciences at UiO registered between 1996 and 2016. Between the start of 2011 and the first term this year, 84 participants in NAFOL have graduated.

total number of registered researchers was 972, and more than two-thirds of them were involved in teacher education. In 2015, the number of education researchers had grown to 2914, and 1753 of them were employed in the university colleges.

- In 2005, personnel with degrees in social sciences and education accounted for 61% of all researchers, while 16% had degrees in humanist disciplines and 13% in science. A decade later, subject didactics was the largest sub-area of education research in the university colleges.
- The publication points in the overall field of education research doubled between 2005 and 2013 and more than tripled in the same years in state colleges with teacher education units as the major sites for education research.

When the interchange between initial teacher education, education research and the teaching profession is important, the overview indicates how English as the language of research, with the extended internationalisation, has become a source for new tension. In teacher education, as in the school sector, L1, the national standard language of teaching, will for obvious professional reasons, also be relevant in research. International English is the main channel of research and knowledge exchanges across language borders, but will in most parts of the world still be the second language of education research in the interaction with teacher education and the teaching profession.

Higher education research policies: 25 years of binary system and 25 years after

Across Europe, the segmented binary approach in research policy and research funding was introduced around 1970, with its divisive character summed up in later research, as in the comment below by the British comparativist Cowen (2004) suggests:

The expression ‘the binary system’ used by the Secretary of State for Education at that time located the polytechnics, technical colleges and teacher training colleges [...] below an imaginary line. The Universities, with Charters from the Queen, were located above the line. Universities were national and the other institutions were local. (p. 91)

In those years, British polytechnics were the new ideal type of short-cycle higher education institutions. In the Norwegian case, the national reforms that started in 1970 represented key efforts to establish the new league of mass higher education campuses. The next wave of national and international higher education reforms began in the mid-1990s and introduced the expansion of research obligations (Kyvik & Lepori, 2010) and was later furthered by the Bologna reform cycles. With this turn towards innovation and knowledge policy approaches, a research mandate was gradually implemented in most Norwegian higher education institutions with only minor changes in their basic funding patterns.

In line with this removal of the binary system, broad reforms of the non-university part of higher education in Norway (Jarning, 2019) were introduced in 1994–1996 and again from 2003. In this way, Norwegian reforms before the turn of the century preceded further

research drift (Kyvik, 2006) in the wake of the national adoption of Bologna-related reforms. Seen together with the changing knowledge patterns, the changes represent a historically new horizon for professional research strategies for teacher qualification.

Towards a professional knowledge nexus in teacher education

As part of his research on entrepreneurial universities, Clark (1994) coined the notion of *the research–scholarship–teaching nexus* to help focus on the interwoven intellectual core of universities. Inspired by these efforts, the more general term knowledge nexus (Jarning, 2019) can help describe and evaluate current and historical packages of interrelated scholarly and professional forms of knowledge in established as well as new-generation higher education institutions.

In recent Scandinavian research on teacher education, the historic tradition that was informed by the seminar contract (Kvalbein, 2003, p. 103; Rasmussen, in Hudson & Zgaga, 2008), which denoted a closely integrated moral, intellectual and pedagogic pattern for the qualification of classroom teachers; the addition of a research ethos was seen as a deviation from the central obligation, that is, the education of the whole person. The knowledge core of the seminar tradition was represented in the two arenas of the classroom and the training school. Research was not commonplace within this nexus of textbook knowledge and practical methodic training. With the knowledge policy agenda from the 1990s, however, a highly different orientation is seen in the notion of the *knowledge triangle* with a triadic nexus—research, teaching and innovation. In the quest for professional coherence in teacher education, a key challenge according to this triadic orientation is to develop approaches that support innovative cooperation within and across school subjects while restricting mainstream academic drift, disciplinary segmentation and closed *republic of science* orientations.

The teacher education knowledge quartet: Subjects, subject didactics, pedagogy and practicum

Key forces behind the change to a triadic knowledge nexus can be related first to the adaptation of short further education for teachers into a national system of mass higher education, and second, to the expanding scope for research over the last 25 years. From the start, in 1973, general teacher education programmes in Norway have combined the four standard components also found in the knowledge architecture of today's initial teacher education: subjects, subject didactics, pedagogy, and practicum with subject didactics as the newcomer.

In Norway, subject didactics was a neologism of the 1970s. In line with German and Nordic trajectories in the field of education, general didactics as a theory of lesson preparation had been included in teacher education in the Norwegian case in an early stage and was present as a core dimension in the construction of the discipline of education from the start in the interwar decades (Kvernbekk & Jarning, 2019). Didactisation of

school subjects, however, reflects the double post-WW2 massification of schooling and of popular culture (Schneuwly, 2011; Jarning, 2016). From the 1960s and 1970s, teachers at all levels of mass education systems had articulated a warning and a loss of direction from obvious traditions (Elf & Kaspersen, 2012). This loss of a strong canon in and across school subjects and their fields of reference represents a major driver behind the growth of didactics as a subject. In embracing the didactic triangle, content, teacher and child, the content issues in a subject were often placed first, as in the *didaktik* tradition.

In the three-year general teacher education programmes, the knowledge quartet was connected in two pairs: three or more school subjects and subject didactics covered two of the years, while education and practicum covered one year. With the extension of the general teacher education to four years, new patterns developed, and with the adaption of Bologna frameworks, the model from 2003 had two years of a common compulsory curriculum followed by two years based on a choice of teaching subjects.

With the gradual strengthening of research-based subject didactic fields, teacher education has come to mediate secondary disciplinarisation of a very different kind than in the patterns seen from the growth of the discipline of education. Key differences are marked with the poly-centered knowledge dynamics that can be followed from new sets of reference disciplines. Reference disciplines and other expert fields in subject didactic research include not only the sciences and the arts, but also practical and vocational subjects with fields of reference outside the academic world of knowledge. The expansion of secondary disciplinarisation around school subjects implies an almost unlimited variation of epistemic fields and forms within education research.

The contrast is the first wave of research-driven secondary disciplinarisation where the discipline of education grew from child studies that had educational psychology as a relatively homogenous core. Historic studies of education as a field of knowledge highlight educational patterns of secondary disciplinarisation, as seen not least from comparative variations in notions of the science of education in singular or plural, and gradually in variations of the construction of the so-called foundational disciplines of education.¹²

For historical and systematic comparisons at least four main orientations can be distinguished. Within each main orientation, varied modes can be expected and possibly depicted and analysed through further comparisons as illustrated below:

Table 2. Disciplinarisation in Teacher Education

	<i>Educational</i>	<i>Didactical</i>
<i>Singular</i>	Science of education	Modern system of disciplines
<i>Plural</i>	Sciences of education Foundational disciplines	Modern disciplines + subject didactics and comparative didactics

¹² The contributions by Hofstetter (2012), Furlong and Lawn (2011), Terhart (2016), and Biesta (2013), all highlight national and historical variations in the formation and development of a discipline of education. In line with German and Nordic patterns, didactics was a part of the core of the discipline of education (Kvernbekk & Jarning, 2019, p. 563).

Key changes in the teacher education research framework that connect to the distinction between educational and didactical orientations is seen from appendix A, table 2. Related more general terms include primary and secondary discipline formation, singular and regional in Bernsteinian terminology (Muller, 2009; Holmberg, 2019), as well as co-production and Mode 1 and 2 and in the much-referred work on the new production of knowledge (Gibbons et al., 1994). The historical studies of educational science and discipline patterns have until now highlighted forms of discipline of education, while studies of the more recent expansion of education research in teacher education¹³ seem rare. In the qualification of teachers, some awareness of the contrasts between didactic and educational secondary disciplinarianisation can support receptivity to disciplinary and cross-disciplinary professional challenges and perhaps invite constructive combinations of subject didactics and more general didactic analysis.

Disciplines, case work, practical synthesis and teacher's professional repertoire

Sources of knowledge, skills and tact of a profession, such as teaching, are highly diverse. In research on teacher professionalism, fragmentation has been a recurrent complaint, while forms of practical synthesis address fragmentation and interrelate contributions from the broad arsenal of knowledge present in the teacher education programmes; practical syntheses are attempts at creating coherence in the knowledge base of a profession. This is the formulation coined by the philosopher, Harald Grimen (2008), to support a more thorough understanding of alternatives to fragmentation in professional fields. While his original focus was to develop a valid perspective on knowledge integration across general disciplines, Gilje (2017) focused on the place of practical forms of knowledge in this wickerwork. Following terms from Aristotle as well as from Gilbert Ryle, Gilje emphasised that the *know-how* and *techne*, the workmanship of teachers, should not be understated in the understanding of forms of practical synthesis.

The varied forms of practical synthesis can, according to the analyses of Grimen and Gilje, gradually be transmitted, learned and expanded. Within a perspective from the work by the two American sociologists and musicians, Robert Faulkner and Howard Becker, this integration of explicit and tacit pieces of knowledge by practical problem solving can form parts of an expanding working repertoire (Faulkner & Becker, 2009, p. 170). Maintenance and development of professional repertoires of teachers can then be seen as the main welfare contribution from education research (Tranøy, 1988) in teacher education programmes.

Practical synthesis and professional repertoire support combinations of contributions

¹³ In studies of educational research contributions by Gundem (2008) and by Schneuwly (2011) point in interesting ways to the initiating roles of subject didactics compared to more general didactical analysis. In Scandinavia, Ongstad (2012) among others, have been seminal in marking systematic possibilities of comparative subject didactics.

from the variety of disciplines in education research, and in less unbalanced ways.

In a hybrid field such as teacher education, references to disciplines as the homeland of a scholarly tribe are among the features of everyday professional cooperation, and not without good reason. While disciplines have lost many earlier functions as primary areas for today's more specialised research communication, the modern system of disciplines, according to the sociologist, Peter Weingart (2010), is still not outdated, but act as a "common framework for various subdisciplines" (p. 11).

Thus, disciplines and their derivatives, specialities and research fields, remain the principal organizational unit for the production and diffusion of knowledge.... To postulate that disciplines lose their function amounts to claiming that the development of scientific knowledge is exclusively directed by 'external' societal and political interests. It would actually imply a reversal of the differentiation process that has been under way for more than two centuries. (Weingart, 2010, p. 13)

In the years, after the Bologna-reforms, warnings against tendencies of dedifferentiation have been raised and the continuous relevance of disciplines as valid frames of reference should not be underestimated, not least in hybrid professional qualification, as in broad teacher education programmes.

In an analysis of case research, Krohn (2010) further enhanced the epistemic understanding of interchanges between disciplines and interdisciplinarity. His proposition is that interdisciplinary research combines a concern for ideographic peculiarities and for nomothetic, more law-like qualities. For Krohn, a professional is seen as "an expert in the investigation of open problems in contingent and complex individual cases, which occur within a certain field of knowledge" (p. 41–42). The relations between nomothetic and ideographic orientations can then be interpreted in mutually supportive ways, as seen not least from the crucial didactic role of casework in professional education, where paying attention to differences as well as to similarities is important.

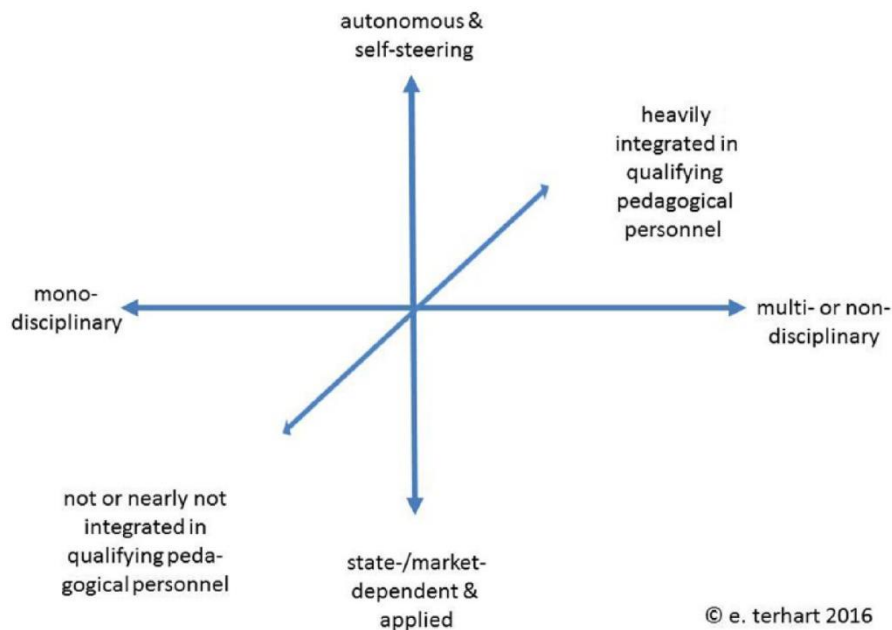
Growing variation of research knowledge: Research and forms of syntheses in the teaching profession

From studies in a German context of the discipline side of education research (*Pädagogik* or *Erziehungswissenschaft*) and the expanding multi/post-disciplinary research (*Bildungsforschung*), Ewald Terhart (2016) introduced a three-dimensional model as a general framework for the description and analysis of the expanding field of education research. This model is also relevant in the analysis of the research arsenal in teacher education where subject didactics represent education research beyond the social sciences. Even though Terhart does not refer to ideas of a knowledge nexus or knowledge triangle, the model focuses on questions of variation and balance of orientations that are important for the analysis of coherence challenges in teacher education programmes and also for the analysis of innovation issues and external professional cooperation. By this, the model can include concerns for disciplines as well as for interdisciplinarity, as brought up in the exemplary comments above from Weingart and Krohn.

On a macro level, Terhart's model supports historical registration of changing patterns in the institutionalisation of education research in the field of teacher education. The model captures two dimensions:

- mono-disciplinary and multi- or non-disciplinary forms and contexts
- degree of integration in the preparation of teachers or little or no responsibility for teacher qualification

Figure 1. A model of organizing education as an academic endeavour



Source: Terhart (2016, p. 931)

In teacher education, the model can be used as a framework for registration of combinations of the standard components in the knowledge architecture: subjects and subject didactics, pedagogy and practicum. Thus, the dimensions in the model can frame analysis of knowledge dynamics, coherence issues and forces of fragmentation, as well as national reforms and local innovation efforts to meet coherence challenges. From Nordic teacher education research, a few examples are chosen to highlight challenges in the development of cooperation across disciplines and arenas in teacher education programmes.

The score for the first term of the initial teacher education a decade ago is attached (Appendix B) as an example of multidisciplinary curriculum work. This didactic orchestration is one among many mechanisms invented over two decades in the general teacher education programmes at Oslo Metropolitan University to balance the workload in disciplines and shared multidisciplinary responsibilities (Jarning, 2012). As seen from Appendix B, the balance between the three main subjects, multidisciplinary tasks and the practicum weeks is indicated in the score. The specified common tasks given the label multidisciplinary (*fler-faglig*) include a short assignment of school start for year 1 pupils, training of basic library and information communication technology (ICT) skills, as well as

an end of term assignment for the two subjects, Norwegian (L1) and the discipline of education.

In research on models and patterns of learning in the five Nordic countries (Elstad, 2020, p. 199), new teacher candidates from each country gave their evaluations of three core components of the education they followed, the subject of education, subject didactics, and placement. In the composite knowledge packages, these subareas represent key professional qualification dimensions of the programmes. Thus, evaluations from the candidates in the last year of the teacher education are of clear relevance to questions of coherence and a professional knowledge nexus. A first finding is that the evaluative patterns are amazingly similar across the five countries. Important in this respect is that subject didactics in all countries gained a higher positive student response than general courses on educational theory. Only in connection to placement was coherence commented on. The qualification of placement mentors to connect to themes from subject didactics and educational theory (Elstad, 2020, p. 203) got a rating below the mean level in the responses from all Nordic countries, and the lowest level from the Norwegian respondents. Concerning both examples, Terhart's model is relevant; to analyse challenges in coordinating a term programme across disciplines and to discuss the higher rating of subject didactics, and also the low rating of practicum mentors in the respondent patterns from the new teacher candidates.

In education research internationally, terms like pedagogy, pedagogic content knowledge, classroom research and design of teaching and learning, represent a family of related approaches to research on didactics of teaching and classroom work, alongside a core of knowledge in and for teacher education and the teaching profession. The findings from the survey of new teacher candidates in the Nordic countries support further development of a triadic knowledge nexus in the qualification of new teachers, with a non-scientistic inclusion of research on school subjects and subject didactics, as well as on less content-related aspects of teachers' work. In the Nordic region, subject, didactics and comparative and general didactics frequently refer to the model of the didactic triangle as a common denominator.

Towards a more varied knowledge repertoire for new teachers

Education research and a knowledge nexus in teacher education

In education research in Norway, earlier academic patterns have been dominant while professional approaches have been more limited, as seen for example in the still weak position of subject didactics in the qualification of new researchers. New efforts on the professional side include the Centres for Professional Learning in Teacher Education (ProTed) at the Universities in Oslo and Tromsø. The centres have developed a model with university schools as practicum arenas in close combination with school-based innovation and research collaboration. It is also relevant to note that general support for

research collaboration with schools and teachers is one among many priorities in recent strategies for education research from the ministry.

However, despite very rapid shifts in national guidelines for general teacher education programmes in Norway, a stable trait has been that incentive structures have met efforts to build research cooperation across subjects with little concern. In national policies as well as in research funding and internal priorities in teacher education units, mainstream single-subject approaches have been predominant. Attempts to focus more on long-term cooperation across disciplines have had difficulty in gaining stable and lasting support.

In this regard, the Terhart's (2016) model is a relevant analytical backdrop. In line with the three-axis model, recurring features of the classification and framing of education research in teacher education units include:

- Unstable internal autonomy, not least through dependency on rapid shifts of national guidelines as well as of ruptures by reforms and mergers
- Teacher education programmes with a basic parallel organisation of disciplines, and with few and weak common and integrating tasks
- Strong dependence on discipline research traditions, with a supplement from small pockets of practicum and apprenticeship in schools

In keeping with a policy focus on knowledge triangles, it seems vital to develop tools and funding mechanisms that can provide more stable support not least for local research cooperation across disciplines and arenas inside teacher education programmes. The reliance by the Ministry of Education and Research solely on the notion of education research in policy work has, until now, omitted foci on the broader interchanges of education research with scholarly and professional responsibilities.

For research in teacher education units to support a common professional knowledge nexus, stable professional-oriented education research policies, national graduate schools in professional education research and long-term funding of comparative subject didactics and classroom research, are among relevant strategies to bridge disciplinary divisions and provide parallelism. Examples from more professional research genres can support the understanding of how schools as research arenas supplement quality standards and, thus, balance professional and disciplinary knowledge cultures differently.

Two traits then come to the fore as strategic. First, there is a need for intellectual dialogue and deliberation regarding the current highly complex mix of epistemic orientations included in teacher education research. Intellectual clarification also includes the related analysis of the limits of social science as a common denominator. Awareness of contrasts between didactic and educational secondary disciplinarisation can support receptivity to common professional challenges and respect and recognition of the great variation of valuable forms of knowledge, including hard as well as soft forms of knowledge and enlightenment. The second cross-cutting issue is to contribute to teachers' professional repertoire building, where themes and forms of knowledge often also relate to issues of skills, apprenticeship, personal knowledge and building blocks for practical forms of synthesis and coherence.

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Appendix A: Major changes after 1960: HE reforms, TE reforms and R&D policies

Two tables developed from earlier publications in Norwegian (Bjørke et al., 2013) plot the main changes over a half-century—from 1960, from 1980, and from 2000. The first table focuses on institutional developments, while the second covers the field of knowledge in and around teacher education institutions.

Table 1. Key changes and reforms throughout the period in the HE sector at large

HE field	HE policies and expansion	TE policy and expansion	HE research policy
1960+	1970+ District colleges (DC) 1976+ Regional college sector	Tradition: 2-year general teacher education in 1973+ TE upgraded to colleges 1977+ GTE extended to 3 years	1949: Research councils 1976 Applications from District colleges accepted
1980+	Almost 100 small RC by 1990 1994: College sector reform - 26 university colleges	G80 National curriculum guideline - 3years G92 4-year programmes and new guideline G98 Revised national guideline	1997+ National R&D strategy for university colleges
2000+	2003+ <i>The quality reform</i> – first phase in the national Bologna adaption 2010+ Merger reforms have led to more universities. By 2020 only few university colleges are left.	G03 NCG 2-years common/2 specialization 2006: National evaluation of GTE G09: Two track ITE for basic schooling break with one track GTE tradition G18: 5y two track ITE with master	2003+ University drift: Options for accreditation of PhD, and as full university on basis of four PhDs. 2008+ Ministry of education launch national strategy for sectoral research.

From the 1990s, national policies to base funding, reward patterns and research education mainly on academic quality standards were strengthened, while a softening of binary hierarchies between the university sector and the college sector were partly accepted within higher education.

Table 2. In TE curriculum guidelines and examples of old and new ITE research areas

TEfield	Subjects and subject didactics	<i>Pedagogikk</i> – Education theory in TE	Sectoral R&D
1960+	The general ITE model is based on broad elementary subject competence. 1973+ Introduction of short courses in school subject didactics	<i>Pedagogikk</i> as professional core field with placement program integrated 1970+ New diverse research on schooling and pedagogy weaken the hegemony of psychology-teaching methods as axis	1970+ More diverse research on schooling and pedagogy weaken the hegemony of psychology-teaching methods as axis 1975+ Subject didactics as emergent R&D fields
1980+	R80+ 1 year for individual choice of subjects. SD in all school subjects. R92: Common part 3 of 4 year of TE. R98: Subjects and SD expand in common 3 year. More time to sciences	R80+ Pedagogy and placement 45 ects R98: Pedagogy 30cp over 3 years. 18-week placement program separate from pedagogy.	1983+ Research council reports on education research in sciences and humanities. 1996+ <i>Utdanningsvitenskap</i> – sciences of education – new framework for TE R&D
2000+	R03: 90 ects compulsory subjects with SD included. One major or two minor additional subjects. R09: Choice between classroom teaching and team teaching. TE profiles R18: 5 year two-track ITE with master in school subjects and pedagogy	R03: Pedagogy 30 ects over 2 years. R09: Pedagogy 1 year in both tracks	2005 Research programs for professional R&D 2008+ Ministerial strategy for sectoral ed. research. 2010+ Subject didactics largest R&D fields in TE

In the adaption of the Bologna reforms after 2000, a feature in the Norwegian case was the introduction of a national framework for institutional upgrading and innovation within the higher education sector. These regulations have been a vehicle for institutional drift.

Appendix B: The first-term score of the general TE curriculum week by week

Appendix: Plan for first term of first cycle at the general TE program at HiOA

Students TE09 – First term - autumn 2009									
Mth	Week	X-time (3h)	Math (4h)	No (3h)	ES (3h)	Multi-disciplinary/Cross-subjected	Assignment/ Exam	Practice	Other
Aug	34	-	-	-	-	ICT: Pre courses, use of computers and introduction to a word processor (computer suites)			Compulsory
	35	-	Mat	No	ES	ICT: Introduction to ICT, LMS/VLE (Frontier) and e-mail (lecture room and computer suites)			Compulsory
Sept	36	-	Mat	No	ES	ICT in the school start assignment, word processing, handling document (computer suites)		School visit - observation Fri. 4.09	Compulsory
	37	Mat	Mat	No	ES	ICT Library and study method course, study strategies (computer suites)	Handing in the school start for guidance (week 37-38)	Cooperation meeting practice teacher	Compulsory
	38	-	Mat	No	ES		Mat Folder requirement 1	Kick-off-meeting before practice	Compulsory
	39	-	-	-	-			Observ.practice	
	40	Pres	Mat	No	ES	ICT/No: Digital folders and file management (lecture room and computer suites) Presentation of the assignment school start. Preparation for observation assignment in the theme Language and learning in practice	No/Mat/ ES Handing in the school start assignment.		Compulsory
Oct	41	-	-	-	-	Observation theme language and learning		Practice	
	42	-	-	-	-				
	43	-	Mat	No	ES				Drama B Mon. F Tuesday
	44	-	Mat	No	ES		No Folder text 1		Drama B Mon. F Tuesday
Nov	45	Mat	Mat	No	ES		Mat Folder requirement 2		Drama B Mon. F Tuesday
	46	-	Mat	No	ES	ICT/mat: Formula editor and painting tool in a word processor – preparing for the exam in number theory (computer suites)			Drama B Mon. F Tuesday
	47	-	Mat	No	ES	No Compulsory response group	No Folder text 2 No/Mat/ES Exam: School start 3+3+3 credits Drama written test + performance		Drama B Mon. F Tuesday
	48	-	Mat	No	ES	ICT Digital photo editor (computer suites) Preparing for picture book week 51			
Des	49	-	-	-	-		No/ES Exam 5 + 5 credits Mat Home exam		
	50	-	-	-	-	A&C Composition, layout and picture expression	Mat Handing in home exam 7 credits		
	51	-	-	No	-	No/A&C/ICT Theme week: picture book ICT/No Guidance picture book	No Compulsory assignment: Picture book		