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技術教育学の探究

第 22号 2021 年 4月

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Academisation of the vocational school teaching profession and the genesis of vocational educational science

A historic country comparison of Sweden, Finland and Germany

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Abstract

The development of the education of vocational school teachers over history reveals analogies in a European comparison. Apparently, the rising demands posed to professional activities on the specialised work level also leads in other European countries to the teaching staff at schools seeking academic qualifications. Using the example of Sweden and Finland, this article demonstrates that initial considerations concerning the professionalisation of the commercial technical vocational school teaching profession began to take shape there as early as in the 19th century.

These considerations have remained within the responsibility of the respective industries for a long period in both of these countries, so that the qualification of teachers takes place at the industry-specific vocational training centres such as the training centres of the forest industry. Only the integration of the vocational courses of education in sixth form of grammar school in both countries has led to a gradual academisation of the specialised vocational teaching staff employed there. At the same time, in spite of the great similarity of the vocational training systems, there are differences in the paths of qualification for teachers. The Finish conception provides for their education in a close practical context at polytechnic universities, while Sweden is moving it to the universities. This results in different professorships at universities in Sweden with a research capacity comparable to that in the German situation about 50 years ago.

Based on statistical data, document analyses and expert interviews on site, this article illustrates the consequences of the forms of academisation for establishing a vocational educational science in international comparison and discusses the effects on the vocational school teachers and the scientific discipline in consideration of the current developments in Germany.

1 Introduction

The financing of the institutions of higher education and universities is a responsibility of the state. The funds are made available in the interest of the state. If a state decides to make the training of its vocational teachers academic and move it to the universities to be able to meet the rising abstract requirements for the vocational education, professorships will be created at universities and polytechnic colleges in consequence (Stratmann, 1994).

When, in the course of the 20th century, the training of vocational school teachers in Germany shifted from the institutions of vocational education to the universities, beginning with commercial school teachers (Pott, 2015; Zabeck, 1999) followed by technical teachers* (Pätzold, 2011; Schapfel, 1994), this was also tied to the establishment of a new academic discipline in the form of vocational, business and economics education (Lipsmeier, 1982). Their original teaching and research object became vocational education with all its dimensions. In the process, it recruited its teaching and research staff initially from teachers at vocational schools but also from related disciplines such as education science, sociology, psychology, and occupational research relating to the labour market, before it could develop its own teaching and research staff from its own next generation of scientists (Götzl, Geiser & Jahn, 2018 and Götzl, Geiser and Müller in this volume).

The following article reconstructs, starting from the personal irritations during research visits to Scandinavia, the structural establishment of the vocational school teacher training in Sweden, Finland and Germany, and sets them into the context of the creation of professorships at colleges and universities, as well as the associated research capacities. It becomes clear from this that the Scandinavian and German polytechnics hardly differ from each other when it comes to research capacities. Research capacities for a scientific field are created to a much greater extent when university professorships are established than when courses of studies are organised at polytechnics, along with the right to the conferral of a doctorate title, the configuration of elaborate research methods, and specialised areas of concentration.

A brief section on the cause of the question arising will be followed in this article by the description the vocational education systems of the compared countries, the current structures of the respective paths of qualification for the activities as vocational school teacher and the development of vocational education research in the compared countries will be illustrated. In order to confirm or disprove the evidence of a connection existing between the academisation of the teaching profession and the establishment of the discipline of educational science in other countries, the two Scandinavian countries Finland and Sweden are considered, which not only have great similarities in the Scandinavian welfare-state oriented educational policy (Michelsen & Steström, 2018; Stenström & Virolainen, 2017), but which have also formed a common state over many centuries (Clements, 2014), while they differ significantly, in contrast, in the form and tradition of their vocational teacher training (Alvunger, 2016; Isacsson, Amhag & Stigmar, 2018; Kaiser & Lindberg, 2019). The discussion focuses on Sweden and merely outlines the differences in the examination of Finland, and they largely presuppose knowledge of the structures in Germany.

To reduce the complexity of the questions examined, exclusively the commercial technical disciplines are considered. The establishment of the commercial school teaching profession as well as the teaching profession for occupations in healthcare (cf. Ertl-Schmuck & Walter in this volume) or also for the occupations in nutrition and housekeeping (Kober, 2011), which have taken different courses at least in Germany, will not be examined in detail. Regional particularities in the development are also not discussed (Maslankowski, 1995; Schapfel, 1994).

2 Bewilderment as starting point

When attending Scandinavian conferences on vocational education research, I noticed that the presentations given by the next generation of scientists who were obtaining doctorate degrees nearly exclusively related closely to the didactics of their vocational specialisations, teaching or exams. The questions discussed hardly ever concerned the systemic structures, the history of vocational education, international comparisons, education theories or also the training activities at businesses. The background of this phenomenon was then quickly revealed by the paths of training the small group of junior scientists in Swedish vocational education research had completed.

Nearly all of the young scientists had come from training, which was tied to a longer period working as a vocational school teacher, which in turn explained their research interest in the areas directly relating to this work. Qualifying papers were rarely part of broader research contexts and projects or based on complex theories or methodological research approaches, which was the case much more frequently in Germany. The “distance” from the research of scientific foundations or the formation of theories can be explained by the course of training, in both Sweden as well as Finland, usually consisting of a scholastic vocational training followed by professional experience at businesses, and then ending with academic training as a teacher, meanwhile this course of training is arranged in many cases so that it is already accompanied by work as a teacher. Moreover, the course of studies for vocational teachers there takes merely one-third of the time as in Germany. This also explains a phenomenon of the self-conception of vocational teachers in Sweden that can be found at home in Germany really only among those, who have previously changed careers, and who Per Andersson describes as follows:

“Vocational school teachers in the construction and renovation industry see themselves differently. Some continue to see themselves foremost as craftspeople while others identify themselves as vocational school teachers. In particular those, who see themselves as craftspeople and who come from the construction industry, place tremendous value on specialised knowledge, based on this understanding.”[1] (Andersson, 2017b, 14, translation by the author). Ulla Johansson’s historically oriented doctorate thesis also confirms this: “In the dichotomy between theory and practise, the vocational education teachers are thus closer to the practical than the theoretical pole.” (Johansson, 2007, 4)

3 Historical lines of development in the three countries with the focus on Sweden

Vocational education still had merely minor significance in all three countries from a government control perspective in the 18th century. At that time in Germany, it was reliant in its systemic development on the private initiative of individuals and certain industries. “... the prior qualification of this [teaching] staff for the specific new tasks through vocational education was seen to by private parties and not the state before the end of the 18th century. In the educational perspectives of Enlightenment and its practical consequences, the teacher education was in fact implied, but no specialised teacher education for these schools with orientation on commercial occupations had developed yet within the framework of political-economic conditions.” (Buchmann & Kell, 2001, 18). This is also similar in Sweden and Finland, as will be explained below. At the same time, many similarities between Sweden and Finland become apparent, which can be explained not only based on the fact that large areas of Finland belonged to Sweden from 1323 to 1809 (Clements, 2014; Kaiser, 2020b). This is also why Sweden is the focus of the comparative discussion.

1 “Yrkeslärare på byggoch anläggningsprogrammet ser på sig själva. Det visade sig att en del av lärarna främst identifierade sig själva som hantverkare medan en del främst identifierade sig som yrkeslärare. De lärare som fortfarande såg sig som hantverkare i första hand hade kvar sin förankring i bygg-branschen och lade därför stor vikt vid yrkeskunnandet” (original Swedish)

3.1 The developments in Sweden

3.1.1 The Swedish vocational education system

The development of the Swedish vocational education system (not considering adult education and advanced training for now) has its origin in the traditional apprenticeship of the trade, which was largely included in school education between the 1920s to 1950s (Larsson, 1989). In the 1970s, the vocational education was nearly completely integrated in sixth form of grammar school and it came with the qualification for university admission (Kaiser, 2020a). In the late 1980s, the meaning of general education increased together with the target orientation of "lifelong learning." Greater portions of the curriculum had been reserved for it (Wärvik & Lindberg, 2018) before the strengths of training at a business and workplace-specific learning has become more important again since the 2000s due to the high youth unemployment rate in Sweden (Lindberg, 2003; Persson-Thunquist, 2015). The apprenticeship at businesses, which existed in Sweden beyond the secondary level only in a few exceptions (electrical and construction trade professions), is currently also making a bid to become established at the levels of the grammar school education and under contracts between trainees, businesses providing training and vocational schools, so that it will be possible here as well to attain qualification for university admission (Berglund, Höjlund, Kristmansson & Paul, 2017).

But let us go back one step in history, and see that in spite of the shift of the vocational training to schools in the past century, a practical phase at businesses has always been part of the vocational training to greater or lesser extent at different times. It was to make the real conditions in the working world accessible to youths and thereby support the ability to choose a profession. The increasing focus since the 1970s on combining courses of education with admission to universities is presently losing importance in favour of a stronger orientation on the labour market. Andersson made this analogy between Sweden and Finland palpable in a current publication: "Sweden and Finland are the strongest representatives of a primarily occupational training with limited elements of leaning at the workplace, even though different initiatives such as apprenticeship training suggest a growing interest in learning at the workplace." (Andersson 2017b, 31, translation by the author)[2] However, Sweden maintains a model of the integrated comprehensive school at the occupational training level, which extends beyond the "Grundskola" (1st to 9th form) and which also integrates the basic vocational educational programmes in secondary level II. For example, the grammar school

2 Sverige och Finland är de tydligaste representanterna för en i första hand skolförlagd yrkesutbildning, med begränsade inslag av arbetsplatsförlagt lärande, även om olika initiativ – bland annat när det gäller lärlingsutbildning – visar på ett ökande intresse för arbetsplatsförlagt lärande. (original Swedish)

Sixth form in Sweden offers 18 different courses of study, merely six of which prepare for university admission. The diversity of the vocational fields of action are summarised in 12 courses of education with names such as: “Children & recreation”, “Hotel & tourism” or “Industrial technology” It becomes apparent in the process, however, that free access to academic programmes at the universities is not given after completion of a vocational education of secondary level II in Sweden. Since the financing of universities is oriented not only to minor extent on the successful completion of degree programmes, the universities check in great detail who it is they admit to the degree programmes and they vastly prefer the graduates of courses of education preparing for university studies (UKÄ, 2018). This way, formal equality of the vocational and general courses of education in the schools system is nonetheless reached, which in times when a strong general educational part was included in the vocational education also resulted in a strong utilisation of the vocational education programmes (Kaiser, 2020a).

3.1.2 Swedish vocational school teacher education

The vocational school teacher education has received attention from the state in Sweden only after 1918. In December 1920, the first course is completed at the specialised central educational institution, the YPECEA – yrkespedagogisk centralanstalt in Stockholm. In rather short courses of one to one to five weeks, teachers are qualified especially didactically in their vocational education (Lindberg, 2003). “The courses include lectures on pedagogics, vocational education, organisation, apprenticeships and teaching methods. Methodically, the programme also covers study visits, consultations and practice hours. The course participants were divided into three groups: commerce, furniture carpentry and industrial mechanics. Besides professional teachers and drawing teachers, engineers, furniture designers, foremen, drafts people, machine fitters, instrument makers, and master carpenters work as teachers. The professional distribution reflects the occupations to be trained. At that time, the teaching profession represented a secondary job in vocational education.”[3] (SOU, 1994: 101, 177, translation by the author). The qualification time was extended to seven weeks over the course of the years. Based on the initially weak financial equipment, by far not all vocational school teachers were trained there at first (Johansson, 2007, 20 seqq.)

[3] “Kurserna innehöll bl.a. föreläsningar som behandlade pedagogik, yrkesutbildningens orga nisation, lälingsskolomas yrkesämnen och änmesmetodik. I programmet ingick studiebesök, auskultationer och övningslektioner. Kursdeltagama indelades i tre grupper: handel, möbelsni- ckeri och mekanisk industri. Utöver yrkeslärare och teckningslärare deltog ingenjörer, möbelar- kitekter, verkmästare, ritare, filare, maskinuppsättare, instrumentmakare och snickarmästare. Yrkesfördelningen visar att de flesta som undervisade inom yrkesutbildningen vid denna tid hade läraryrket som bisyssla.“ (original Swedish)

After just nine years, these institutions were closed again and the re-integration into a "systematic" vocational school teacher training began only after the Second World War. The recommendation according to a study by the Royal Administrative Authority for Vocational Education (KÖY – Kungliga Överstyrelsen för Yrkesutbildning), which suggested extending the term of training to overall nine months, of which 15 weeks were planned as theoretical training, followed by five months of practical training at a workshop school, was implemented accordingly. The training was to be completed by teaching a practical trial class (SOU, 1994: 101, 178). The teachers without qualification at the vocational schools typically did not have an academic education in the subject to be taught or an apprenticeship or occupational advanced training, coupled with several years of professional experience.[4] The subjects of general education are taught by teachers of sixth form at grammar schools who do not have any professional experience outside of schools.

In the 1950s, the vocational education at schools was widened and this resulted in consequence in strong need for vocational school teachers. There was high demand and more than 350 applications were received for the merely 30 training places in the year 1950 (ibid. 179). The length of the training at the teachers' academies increased successively to 33 weeks in the 1960s and to 40 weeks in the 1970s.

The reform of secondary level II and the communal adult education in the early 1990s presented new requirements for the education of vocational school teachers. A study of the requirements for the qualification of teachers of secondary level II in vocational education fields was conducted in 1993. The proposal was made in the final report quoted above, which is entitled "Raise the Yardstick!" (SOU, 1994: 101), to have applicants for the teacher training programme complete an academic course of studies with at least 80 credits, besides the basic professional training of secondary level II and professional experience. In September 1996, the government decided a change in the form that students should pass at least 40 credit points for the vocational teacher position to be admitted to the teaching profession. Moreover, a relevant vocational university education with at least 60 credit points would be required before teaching a subject in secondary level II of vocational subjects.

By now, a degree for teachers of subjects of vocational education includes overall 120 credits, whereas a large number of this scope can be credits transferred from other fields. Until the mid-1990s, the one-year vocational school teacher education in Sweden was accommodated at special institutions, comparable to the ones of the vocational education institutions in Germany of the 1950s.

[4] This is continues to be customary in Sweden to this day, even if one does not have a right to a permanent employment without the complete training as a teacher.

The admission requirements were basic occupational training and at least seven years' recognised professional experience. A study commissioned in 2008 revealed that the need for trained vocational school teachers had tripled since the mid-1990s and until 2009 and, at the same time, the number of applications for the teacher training with focus on vocational education had strongly receded (Prop.2009:10:89, 29). The government proposal envisioned a standardisation of the teacher education in Sweden, so that all teachers, in whichever kind of school they taught, ought to have studied the subjects/topics taught in depth, would pass at least 30 ECTS comprehensive accompanying studies in teaching and school (practice) and complete a course of studies in pedagogics and didactics at least 60 ECTS. In particular, the requirements in early support for gifted students and in the field of special education were raised. Teachers, who want to work in the field of assisting persons with special needs, must now complete a course of study of 1.5 years (90 ECTS) in addition to passing the teacher exam.

However, when comparing the teachers at vocational schools to the aforementioned formal qualification requirements for all teachers, the requirements for vocational school teachers remain rather low in comparison, so that now a course of studies at the university level is required with at least 90 ECTS[5] for people who have previously completed an academic programme in the subject they teach (e.g. nursing, early-stage education, mechanical engineering, etc.) or who have completed training in a profession. Of these 90 ECTS, 30 ECTS should be dedicated to the core areas of pedagogics, which are also treated in the other teaching programmes, and 30 ECTS should be dedicated to practical training at the school. Teachers, who have already taught for many years, can be granted an exemption from the practical part by validation of the existing knowledge. Interestingly, the proposal points out the special requirements of the vocational school teachers with regard to the specialised didactic requirements, which are, e.g., associated with the qualification portions shifted to the workplace and which thereby also follow the dichotomy in the creation of their identity (Köpsén, 2014; Nylund & Gudmundson, 2017).

Legal regulations make clear that the prerequisites for admission to the course of studies in vocational school education and the following activity are rather soft and ultimately require only a course of studies of 90 ECTS, which can be reduced, if applicable, to 60 ECTS when practical teaching experience at vocational schools is present. How the admission prerequisites are recognised, and what these are in the individual case is up to the respective university where the course of studies is organised. In the individual case and in consideration of the respective specialisation, the university, the competent authorities, and the organisations of the working world are to be involved in the decision on the individual case (ibid., 54).

[5] This minimum scope results when specialisation is proven in the form of a relevant Master's degree.

De facto, however, the schools giving employment play a not merely insignificant role in this decision and in the question of whether there are at all any alternatives for hiring in the specialism being taught.

To counteract the fact that there continues to be an unchanged need for the qualification of teachers at vocational schools, which must take other paths than an academic education, the Swedish schools authority issued a programme in 2013 for the qualification of teachers that is closely related to the workplace. At the same time, the relatively new task is also considered, which is contributing to shaping learning at the workplace and coordinating with the persons responsible at the businesses in the process. “During Work-based-learning (WBL) the students have a supervisor which must have the required vocational knowledge and experience and be appropriate as supervisors. Generally, the VET teachers visit the students during their WBL and consult with the supervisor before grading.” (Alvunger, 2016, 39) The fact that the actual formal requirements are fulfilled only by some of the vocational school teachers was pointed out again in 2017 in an article appearing in the journal of the Swedish Teachers’ Association and it contemplated that less than 50% of the teachers employed in the specialisations of metal and automotive have completed a relevant teacher training, while these are about 80% in the field of health and social services (Andersson, 2017b).[6]

3.1.3 Vocational education research in Sweden

Sweden does not have a state-run institution, which is explicitly concerned with vocational education. Oversight of vocational education is integrated in the central schools office (Skolverket), at which the also a “Lärlingscentrum” apprentice centre has been installed, which is responsible for expanding this form of more practically oriented vocational education. Small studies are commissioned by the schools authority, but other than statistical analyses and reports, no independent research is being conducted (Kaiser, 2020a). Private research institutes dedicated to vocational training likewise do not exist in Sweden. Accordingly, the vocational education research the situation of which was analysed systematically for the first time by Lindberg (Lindberg, 2004) foremost relies on research at universities. This shows that, besides some historically oriented contributions and dissertations, there is primarily research relating to vocational education and system culture, which apart from a few exceptions is prepared by scientists oriented more on sociology or macroeconomics (cf. the Swedish authors in the international

[6] A survey of attending vocational school teachers confirmed this finding during the visit to the annual conference of the so-called “teknik colleges”, which is an alliance of vocational school centres with a technical focus in all of Sweden, in 2018 in Västerås. Most of them had not completed a teaching programme at the university.

Scandinavian study “Nordvet” (http://nord-vet.dk) on the vocational education chaired by Christian Helms Jørgensen of Denmark). Researchers of vocational education with a relevant background in vocational education, who deal with the concrete research of teaching and didactical concepts, disadvantaged groups of persons, teacher training, and political objectives of vocational education, and who then also publish in some cases internationally can currently only be found in isolated cases (cf. ibid.) International publications and editorials, even including the trade journal “Nordic jounal for VET”, the chief editor of which is in Linköping, can only be found as of recently, in the course of the increasing establishment of professorships for vocational education at the universities of Stockholm, Göteborg, Umeå and Linköping. By virtue of the recently installed professorships at smaller universities in the country, such as Karlstad, Växjö, Kritanstad and Falun, research relating to schools, teaching and the vocational teacher education is being conducted there to an increasing extent.

Besides the international conference on vocational education research having taken place annually since 2012 in Stockholm (Moreno Herrera, Teräs & Gougoulaki, 2019), there have been two doctoral programmes in the past decade (Lindberg, 2010), which have been sponsored by the Swedish research council (Vetenskapsrådet), and which have contributed not only to a networking of the researchers of vocational education in Sweden but also to the international exchange, thereby promoting not merely insignificantly the further professionalisation of Swedish vocational education research. Nonetheless, these research works have primarily remained isolated occurrences, which were not integrated in larger research contexts, which hardly referred to each other and which could not resort to an established community comparable to the German section of vocational, business and economics education at the national level. Accordingly, the implementation of larger research programmes and projects, and a broad cross-regional cooperation still represents a big challenge in Swedish vocational education research.

It should be noted that the shift of the vocational school teacher training to the universities in Sweden in 2011 (Asghari & Berglund, 2020) strengthens the research capacities at the universities. However, there cannot be any mention of a stable research community and/or business discipline. Instead, it presents itself in a very early, still fragile stage in the transition from “amateurish science” and “emerging academic science” if you want to consider the systemisation by Clark (1973) (Reinisch, 2009).

3.2 The development in Finland

Since many structures in Finland vastly emulate the Swedish conditions, the following statements will be much shorter.[7] As in Sweden the initial vocational training is essentially part of secondary level II and found at the schools in its present form. Even though a business-oriented apprentice training according to the master craftsman model of the dual system also exists, it has so far been reserved primarily for adults and merely 6% of the youths of any one year participate in this model. The scholastic variant, as in Sweden, has an average duration of three years and it comes with practical training parts at businesses, but it also leads to the university entry qualification with similar restrictions as in Sweden, meaning in practical terms that not all options for university studies are accessible after the successful completion of a course of vocational education of secondary level II.

In 2018, the Finnish government began with a massive reform to enable youths participating in vocational education programmes of secondary level II to leave school at any time and develop their skills further in practice at businesses and return to school after optional periods of time, in order to continue with the education or also participate in modules of other courses of training (Eurydice, 2019). This way, the model for youths is adapted to the free adult education with the aim of reaching a better transition into the labour market saving costs at the vocational schools, and facilitating more customised courses of education for the youths. This model is coupled with modular competence tests, which are conducted by the vocational school teachers in cooperation with the local business representatives, and with customised competence development plans, as they are known in Germany, in the form of customised plans for assistance in the context of support for disadvantaged persons. In other respects, the Finnish vocational education system strongly resembles the Swedish system, having very similar bundles of electable vocational specialisations, which are taught in combination with general educational subjects at educational centres that are well equipped when it comes to the development of practical skills. The vocational schools, several ones of which the author could visit during his stay in Finland, as in Sweden, have very large workshops facilitating a high quality of the practical training and also offering services on the local market. For example, cars are painted and repaired there, garden sheds are built, hair is cut and food is offered just to name a few examples.

7 Regarding a detailed review, it is referred to the excellent histories developed by Virolainen, Stenström and Heikkinen and regarding a consideration of the current situation it is referred to the description at the EU level (CEDEFOP, 2019).

At the same time, they are closely entwined with the regional economy to be able to utilise practical training places available there (Rintala & Nokkelainen, 2020).

3.2.1 Development of the vocational teacher education in Finland

There can be no mention of systematic teacher education in Finland before 1863, which was when a teacher education institute was founded in Jyväskylä (Valthonen, 2013, 161). Meanwhile, it must also be remembered that Finland was mostly structured agriculturally until as late as the 1950s and characterised by rural regions (Laukia, 2017, 10). Its industrialisation then progressed strongly, even if though there had been some industrialised regions before then, especially in the southern part of the country.[8] Through the change from the agriculturally characterised society to one that is characterised by industrial production and services, also a rising need of abstract qualifications and teachers occurred. This is also illustrated in the following figure, which states the official number of teachers.

TABLE III. Vocational teachers and general teachers

Period	Vocational teachers	General teachers (excluding part-timers)
1850–1860	100	1000
1880–1900	950	2200
1920–1930	1200	7500 (5300 primary + 2200 secondary)
1980	13,500 (excluding part-timers)	39,200 (34,000 comprehensive + 5200 upper secondary)
1990	20,000	43,600 (38,000 comprehensive + 5600 upper secondary)

Fig. 1: Quantitative development of teachers in Finland from 1850 to 1990 (source: Heikkinen, 1997, 412)

While it was decided by a big debate in Finland in 1910 that the vocational training should be scholastic after overcoming the dominance of the guilds, the country also built workshops at schools accordingly, in order to grant practice a high priority at the same time (Laukia, 2017). The massive expansion of the vocational teacher education in Finland after the 1970s was decisively related to the fact that the vocational education became part of the state-controlled educational system in the year 1973 while it had previously been under the control of the industries and businesses (Stenström & Virolainen, 2019).

8 The leap of change in the late 1980s and 1990s, which was then accompanied by the development of IT in Finland, was expressed by one Finish university teacher in an informal discussion as follows: “We climbed down from the trees and worked hard in our Nokia rubber boots, and then suddenly had a mobile phone in our hands.”

These maintained their own, industry-specific educational institutions and provided the levels of specialised work foremost with vocational qualifications the degrees of abstraction of which increased by the turn of the 20th century. “Since the turn of the 20th century the part-time schools for apprentices and idle youth were substituted by full-time schools for crafts and industry with programmes for educating skilled workers and supervisors. The rapid expansion of white-collar jobs promoted the establishment of municipal schools for administration and commerce.” (Heikkinen, 2017, 242) Accordingly, it can be seen in Finland, similar to the development in Germany and Sweden, that there was a split of the educational paths for commercial employees, who had attended a public school of the municipalities, and aspiring workers, who had attended specific trade schools where the teachers merely had trade-specific qualifications (master craftspeople).[9] This remained the tradition in Finland also after the integration into the general educational system and initially there were more than 19 different courses of education in the vocational teaching profession oriented on the industry-specific educational centres. The integration of vocational education, combined with learning at teaching workshops and the acquisition of the university entrance qualification became a model of success in Finland and quintupled the number of students in the time between 1950 and 1980. The reform in the 1980s then prohibited employing vocational teachers with qualifications below the academic level, before a consistent concept for all vocational specialisations emerged in 1995.[10] From this point onward, all vocational teachers have been educated at polytechnics. These primarily polytechnic colleges frequently originated from the previously mentioned trade schools and academies. They now become universities of applied sciences and draft a concept per se similar to a one-year vocational teacher education, which, building on its tradition of teacher training, is focussed on the structuring of classes and competence-oriented exams, and requires a relevant university degree at least at the level of a Bachelor’s degree (Isacsson, Amhag & Stigmar, 2018). The educational path in this form for the vocational teaching profession differs foremost from all other courses of study for teachers in the country, where, as in Sweden, a Master’s degree from a university is required. Practical skills, ties to the regional economic structure and the ability to teach in a heterogeneous class, are the central requirements (Kaiser & Lindberg, 2019). The access to the vocational teaching degree programme is extremely appealing in Finland and three times the number of applications over admissions are received (Laukia, 2017). The general educational portions of classes are taught by other teachers, who have a Master’s degree.

9 For example, the polytechnics for forestry educated their new teachers at their schools themselves according to their own requirements up until the 1980s.

10 The developments were reconstructed in an interview of Anja Heikkinen by the author at the Tampere University in January 2020.

3.2.2 Vocational educational research in Finland

The vocational teacher education in Finland takes place by now at six polytechnics and one Swedish-speaking university in Turku/Åbo. It is integrated there in the area of the general educational sciences and has little context with vocational education.[11] At other places, it is taught by lecturers, who do not have a professor title like at German polytechnics or the related, at least minimal research capacities. A doctoral degree cannot be obtained from these polytechnic colleges either, so that the lecturers employed must go to a university for their doctoral degree. Accordingly, the vocational education research takes place at the polytechnics which is why it is only very limited in the direct context of the teacher training. Therefore, the vocational education research in Finland is primarily limited to commissioned research, which is contracted by the state schools authority, and tends to pertain to policy studies and evaluating structural political research. Research treatment of the vocational education takes place at two university locations in Finland. This is a professorship in Tamere, which is strongly oriented on adult education and the historic development, and one that primarily treats technology and university didactics at the same location. Besides this, there is also one working unit without professorship at the University of Jyväskylä.

Nonetheless, a country-language, scientific journal on vocational education (https://akakk.fi/), published by the University of Tampere, is available, which appears online as well as in print. Contributions by authors from other Scandinavian countries and sometimes beyond can also be found in this journal.

3.3 Brief comparison to the historic development and the situation in Germany

3.3.1 The development of the commercial technical teacher training

The systematic training of commercial technical teachers at vocational schools in Germany emerged a little earlier than in the two Scandinavian countries. It began in 1834 in Karlsruhe, initially with a short qualification at the polytechnic, which was strongly oriented on teaching work and aimed comparably strongly at the regional needs of the trade (Zimpelmann, 2019).

11 Statement by a lecturer employed there at a seminar for teachers at vocational schools in December 2018 at the University of Helsinki.

At the turn of the 20th century, the systematic training structures prevailed, sometimes more strongly academically influenced and sometimes more as independent vocational education institutions. At the same time, they are in fact similar to the existing models in Sweden and Finland. “For example, the “State seminar course for teachers of technical advanced training schools” existing since 1913 in Berlin-Charlottenburg trained craftspeople, skilled workers of industry and primary school teachers as technical instructors within one year. Only in 1925 was the training extended two to years, at the same time as the seminar course was renamed into “State vocational education institute” (Rüzel & Schapfel, 1993, 8). The resistance against making education academic was strong at first and it was supported by the economy up to Georg Kerschensteiner, Theodor Litt and Eduard Spranger, who feared a reverse development to a theoretical advanced training school at the vocational schools (Kerschensteiner, 1927). During National Socialism, the “technical teacher training” was standardised in 1942 to a length of four semesters at vocational education institutions. The standardisation was reversed again in the post-war period in favour of longer courses of education based on regulations decreed by the federal states (Mehnert, 2000). The reason for the demands from technical teachers’ associations for making the education academic and for the related adjustment of the pay to the pay of commercial teachers were finally heard was the great lack of commercial technical teaching staff at the vocational schools, as can be read in an unpublished expert report of the KMK of 1957. The corresponding courses of study were introduced at general universities and the universities of applied sciences in Saarbrücken 1959, Cologne, Aachen and Stuttgart in 1961, in Darmstadt in 1963, in Munich and Hannover in 1964, in Berlin in 1965, in Kaiserslautern in 1970 and in Karlsruhe in 1974 (Sommer, 1992, 36 seq.)

In contrast to the previously described development in the Federal Republic of Germany, the training in the German Democratic Republic has taken place since the 1950s at universities in Dresden, Magdeburg and Karl-Marx-Stadt in a nine-semester course of studies. This involved a one-phase teacher training with integrated internship and concentration on merely one subject, which was transferred into the existing models from the Federal Republic of Germany in the course of the reunification (Thomas, 1992).

In substance, the “pre-academic models” were strongly oriented on the practice at businesses, based on the Frankfurt method and later experimental technical courses. The educational mission in special consideration of the socioeconomic context was to be developed based on the work processes so not to engage in a utilitarian adjustment qualification (Brechmacher & Gerds, 1993).

The academisation was accompanied, as some had feared beforehand, by a strong alignment on the existing engineering sciences, which also culminated in specialised didactics in a departure from the work process orientation. Professorships in specialised educational science were partly staffed by engineering science professors and operated with the didactic reduction of engineering science contents (Gerlach & Saniter, 2009), without developing independent specialised didactics.[12]

Maintaining the academic education of commercial technical teachers in Germany seems to be uncontentious today, even if it is indeed subsumed from this that making the education academic has not ended the bottlenecks in the supply with teaching staff having the relevant qualifications (Krüger, Kaiser, Faßhauer & Jorzik 2019). Current strategies at the universities to create an improved proliferation of the offer of studies across regions, cooperation models with polytechnics (Fahle, Faßhauer, Kaiser & Krumann, 2016) and initial considerations to link digital educational offers.

3.3.2 The situation of research on vocational education in Germany

At this juncture, it is not possible to give an outline of the development of the history of education research in Germany (Lipsmeier, 2010[13]). However, it cannot be pretended either as if education research took place in Germany merely under professorships of universities. This is bearing in mind that vocational education research is established in many respects.[14] On the one hand, it is institutionally rooted, with the enactment of the BBiG [Vocational Training Ac], in the 1969 founding of the Bundesinstitut für Berufsbildungsforschung [Federal Institute for Vocational Education Research] (BBF), today's Bundesinstitut für Berufsbildung [Federal Institute for Vocational Education] (BIBB) headquartered in Bonn, which besides the Institut für Arbeitsmarkt- und Berufsforschung [Institute for Labour Market and Vocational Research] (IAB) is one of the major suppliers of data for the labour market and vocational education policy. Even if the BIBB is responsible merely for the business side of the vocational education according to the law, it initially researches structure, curriculum, educational rules, adult education and media in its five main departments (BIBB, 2010, 25).

12 This gave rise to the dispute smouldering to this day between an alignment on work processes or on engineering sciences at an early point already, which lead in 1998 to the founding of a society for technical sciences and their didactics (GTW) as a part of the Deutsche Gesellschaft für Arbeitswissenschaften [German Association of Occupational Sciences]. Here, foremost representatives located in northern Germany of an alignment on work processes, referred to as "occupational sciences" joined forces for research, publications, and conferences (Hägele & Pangalos, 2012).

13 Also references can be found here to the precursor structures in consideration of DATSCH (Deutscher Ausschuss für Technisches Schulwesen) [German Committee for the Technical Schools System] and DINTA (Deutsches Institut für technische Arbeitsschulung) [German Institute for Technical Vocational Schooling], which involved making the drafting of teaching materials more scientific and which can be regarded as vocational educational science research.

14 For this reason, Adolph Kell takes a different stance in his analytical contribution on organisations and institutions of vocational education research in university and non-university vocational education research at the national and state level, as well as private non-university institutions (Kell, 2010).

Only after the transformation into the BIBB and the change of competencies from the Federal Ministry of Labour to the Federal Ministry of Education Research (BMBF), it also attains sovereign tasks in the development of education and advanced training rules, and it grows into the world's largest institute of vocational education research and development, also through its expansion due to the acceptance of administrative tasks as project carrier under subsidy programmes of the EU and the federal government, e.g., also the funding of industry-wide educational institutions and business-based pilot projects. It is also important to recognise that these sponsorship programmes, have always simultaneously and latently also served the purpose of promoting research by supervising pilot projects scientifically and evaluating programmes, and time and again specifically promoting the cooperation of educational practice and research. The fact that university research since the 1990s can no longer profit from this as much as before has to do, on the one hand, with the creation of private research institutes (GAB, fbb, inbas, gebifo etc.) and, on the other hand, with the reduction of the available funds, and the increasing alignment of the university professorships on "high quality" or "non-practice based" research, which then also offers chances to procure funds from Deutsche Forschungsgemeinschaft [German Research Foundation]. Compared to such methodically and theoretically based research, for example, the proceeds from pilot project research seemed rather low (Nickolaus & Schnurpel, 2001), even though the senate commission of the German Research Foundation (DFG) has highlighted the significance of accompanying research in a positive way (Lipsmeier, 2010, 24).

The fact that professorships could begin to network and that independent vocational education research could become established is decisively linked to the academisation of relevant teacher education. Accordingly, the first appointments to economic pedagogic professorships followed to the academisation of commercial teaching and the staffing of the vocational education professorships in a corresponding course of time to the academisation of the technical teaching profession. "At universities, BBF[15] foremost developed in parallel to the vocational school teacher education becoming academic" (Kell, 2010, 56). With regard to vocational education, the thrust of the 1960s and 1970s can be traced back in a study by Marschner. While in the period from 1930 (Jürgen Wissing) until the late 1950s (Otto Monsheimer) merely six relevant professorships were appointed, 19 appointments followed in the years 1960 to 1980, of which 11 were installed in the 1970s alone (Marschner, 2018). The founding of the vocational, business and economics education division as a part of the Deutsche Gesellschaft für Erziehungswissenschaften [German Association of Education Sciences] in 1964 also falls within this period of a new beginning in vocational education research in Germany. This also came with a clearer localisation of the professorships in education science, beginning to

15 Bundesinstitut für Berufsbildungsforschung [Federal Institute for Vocational Education Research]

network there, even though it should not be left unmentioned that of course there are also other relevant vocational education researchers, who work in feminist research, university and adult education, biography, youth or labour market research and who publish vocational education research and are accordingly members of other scientific communities.[16]

When viewing today's status of vocational education research in Germany, it has more than five established specialised journals with different orientations and recognised review procedures, besides the specialised association mentioned above,17 and most recently it additionally also has an international professional journal with the main publishers being from Germany (IJRVET). The conference of the aforementioned division takes place once annually, and the university days of vocational education aiming at a stronger dialogue between theory and practice take place every two years, supplemented by thematically specific conferences of the Vocational Education Research Working Group (AGBFN) and the previously mentioned GTW. Furthermore, there are conferences of the BIBB and the IAB, as well as programme-specific conferences of the federal and state ministries. In this regard, it is also noted that the conference are now suitable only rarely for a dialogue between theory and practice, because the scholastic and the practice at businesses is no longer represented there.

Taking a look, for example, at the volume published by Felix Rauner on vocational education in 2006, it becomes clear by the 96 specialist contribution how diverse the subject fields and methodology of the vocational education research in Germany have become. This is also reflected in the foundational work on the basic curriculum of vocational, business and economics education, which appeared in 2010 (Nickolaus, Pätzold, Reinisch & Tramm, 2010). Accordingly, regarding commercial and vocational education in Germany, it can be doubtlessly spoken of an established science in the definition of Clarke (1973).

4 Conclusion

The contribution has analysed the institutional structures and the forms of the vocational teacher education with a focus on the commercial technical area in comparison of three countries and the strengthening and establishment of vocational education research goes hand-in-hand with the academisation of the courses of education. It becomes clear from this that a distancing from the practice of company-internal training occurs in parallel to academisation and in part, also with a distance to the practice of teaching. It also becomes apparent

16 For example, Walter Volpert, Martin Baethge, Sabine Pfeiffer, Gerhard Bosch, Erich Latniak, Jutta Almendinger should be mentioned.

17 Running the risk of remaining incomplete here, the journals should be mentioned here, which are devoted nearly exclusively to vocational education and which primarily publish scientific contributions: ZBW, BWP, bwp@, berufsbildung, Bildung & Beruf, language in profession, and teaching and learning.

that the academisation in this teaching profession comes much later than this is the case in the area of general education and, in Germany, in the area of business administrators. The fact that the establishment of commercial technical teachers' education occurs as late as it does in all three countries may be connected to the fact that the significance of the written language does not spread in the relevant professional practices enough for an accompanying theoretical scholastic vocational education having been deemed necessary. Around the turn of the millennium, the Finnish Swedish vocational education research Lindberg demonstrates: „The 'theorisation' of vocational education, that has been claimed to be a consequence of the academic subjects, can be seen rather as a change within the vocations from an oral to a literate culture. In completing many of the tasks observed, theoretical knowledge from different domains, as well as skills were needed. Vocational education as a purely 'practical' education is therefore a myth." (Lindberg, 2003, 3). In spite of this finding that written communication and documentation also plays a lead role in the everyday actions in many subject-specific professions, the situation in Sweden continued for many, even after a change in the law in 1928, that the hiring of teachers at the vocational schools was not guided by the demanded legal minimum requirements of a theoretically well-founded education (Johansson, 2007, 21).

For a few decades by now in Germany, the first phase of the teachers' qualification at vocational schools has taken place nearly in all cases at universities (Klemme, 2011). Polytechnics have been admitted again only recently (Fahle et al., 2017), while in Sweden merely an educational qualification without academic degree has taken place at universities, and in Finland, it is taking place only at the level of polytechnics whereas an academic degree in the subject taught is required (Kaiser & Lindberg, 2019).

The fact that the vocational school teachers in Germany are in a particularly complex and very different action situations in education and the fact that the standards related to the subjects they teach is so strongly differentiated makes the qualification as difficult as it is and extremely demanding. This is foremost related to the diversity of the persons to be educated with regard to age, prerequisites for learning, etc. while it is also related to the diversity of the educational objectives of the courses of education in which the vocational school teachers are employed (Kaiser & Kalisch, 2019). They range from offers to prepare for a profession on the DQR level 3 through technical schools and vocational grammar schools up to entering advanced training as master craftsperson at the DQR level 5. In addition, demands for quality in the implementation are rising and these not only relate to the class association but they are also to consider the individuals sufficiently while, at the same time, a nearly professional management and moderation is expected in the regional and school-internal innovation processes (Grollmann, 2005, 220 seq.)

Academic professionalisation is currently believed to have the most potential for offering a preparation of these diverse open-ended action situations.

At the same time, the Germany-wide courses of studies aim not only at the work at vocational schools with two subject taught but also at work in the company-internal education and HR departments at businesses and in advanced training, education administration and policy, and finally also in scientific research and teaching (Lempert, 2010, with reference to the basic curriculum of the BWP). This is ultimately shown in an excessive demand placed on this divergence when the master level is to be reached in the respective field; this is so especially in light of a strongly scholastic form of the course of studies, which hardly permits any options. The different aspects of the practice at businesses of the later students (which the teachers have dealt with in the training or internships prior to the university studies), the structure of classes and exams (relevant later field of work after the course of studies) are largely not integrated in the studies and their potentials in light of a theoretically reflecting discourse are not embedded in the studies. The qualifications in Sweden and Finland, which aim at a small number of activities (only one subject), represent a solution model to reduce complexity and refer to a condition, which has previously existed in Germany in a similar form. However, because they are equipped with high esteem and status, and also a financial incentive (Sweden pays vocational school teachers the same salary as general education teachers at grammar schools, independently from their qualification level), the supply with teachers seems to represent much less of a problem.

Accordingly, is it sensible to divert to strategies, which permit options in the fields of study, as is the case in the partly modular education rules, as the studies progress, and which lead more to company-internal training and advanced training, education administration and policy or into research? At the same time, the opening of accesses can be envisioned, which facilitate specialists interested in vocational education a perspective of attaining a full teaching position by means of a qualification in educational courses designated for teaching work and based on continuing education. This differentiation is made rudimentarily in the commercial educational courses of studies with frequently one subject of study, which does not lead to a teaching position, whereby the related omission of a second teaching subject helps save time in the course of study by concentrating more on other activities.

At the same time – and I hope this article has demonstrated this – there is a strong connection between the educational forms of vocational teachers and the research capacities for vocational education research, which are created in connection with this at the universities (Sweden), become established as an independent educational discipline (Germany) or not (Finland). The consequence for the institutionalisation and professionalisation of vocational

education research in the countries can be seen offhand. While there is an established science with regular national conferences, several journals and a large number of professorships in Germany, there is merely one journal in Finland devoted to the topic and there is not a single professorship at a university. In Sweden, a similar situation is found, which has only changed in the recent past by the establishment of the academisation for the vocational school teacher position.

Therefore, reforms in the vocational school teacher education from the perspective of the vocational education researchers are to be advanced carefully if one does not want to risk the helpful contribution of an established vocational educational science to the qualification of the teaching staff. Only it will create the conditions for a thorough reflection on the given circumstances and their genesis, which are based on elaborate models, conceptual development of new concepts, and taking a look at other countries, thereby enabling well-reasoned alternatives for actions, making an improvement of the qualification for the entire vocational education sector possible. However, for vocational education science to be able to make the case for its contribution to the improvement, it needs to find a good balance between the research of foundations and applications, and a not negligible development need is required, as well as the willingness of university teachers to add "... output and process-oriented components to a primarily input-based quality assurance and control model." "The process orientation in control and quality assurance would correspond to an integrative teacher education, putting the so far separated teacher education phases into a context with each other" (Grollmann, 2005, 222).

This calls for the willingness of ministries of culture to experiment with scientifically supervision; pilot projects, which test and evaluate different courses of education, as stated in the demands of the innovation network 2018 (Krüger, Faßhauer, Kaiser & Jorzik, 2019) and last but not least, it calls for the creative drive and the willingness to enter risks of failure and thereby treat the matter openly and transparently as an opportunity to learn. The current incentive systems of universities and research sponsorship if any should be ignored in this.

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技術教育学の探求　第22号

発　行　日　　2021年4月30日
編集・発行　　名古屋大学大学院教育発達科学研究科
技術教育学（横山）研究室
（http://gijyutukyouikugaku.blogspot.com）
名古屋市千種区不老町

ISSN 2189−6348

Bulletin of Institute of Technology and Vocational Education

No.22 April 2021

CONTENTS

Edited and Published by
Institute of Technology and Vocational Education
Graduate School of Education and Human Development, Nagoya University