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The Typology of Initial TVET Teacher Education in Germany

Tipología de la formación inicial del profesorado de EFTP en Alemania

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Resumen: El discurso sobre la formación del profesorado en Educación y Formación Técnica y Profesional (EFTP) en Alemania está dominado por la gran demanda de docentes en diversas carreras de EFTP. Podría decirse que la escasez de docentes en EFTP es parte de la "tradicción" del sistema de EFTP. Durante muchos años, las universidades han desarrollado nuevos programas de formación inicial de profesores de EFTP para hacer frente a este problema. Sin embargo, esto ha dado lugar a una estructura poco transparente en los programas de titulación ofrecidos. Con el fin de lograr transparencia en la formación de docentes, este artículo presenta, como resultado de un enfoque de investigación cualitativa, una tipología de los programas de formación inicial de profesores de EFTP. La base de la tipología presentada es la información proporcionada por todas las universidades de Alemania (N=52) que ofrecen programas de formación profesional para profesores. A continuación, esta información se construyó a través de una matriz con criterios específicos, dando como resultado una tipología de siete modelos de estudio diferentes. En conclusión, podemos ver que, aunque los modelos tradicionales son los más ofrecidos en las universidades alemanas, se enfrentan a una gran cantidad de modelos de estudio diferentes que, en general, no se consideran tradicionales.

Palabras clave: tipología, EFTP, formación de docentes

Abstract: The discourse on Technical and Vocational Education and Training (TVET) teacher education in Germany is dominated by the high demand for TVET teachers. A shortage of TVET teachers is arguably a part of the "tradition" of the TVET system. For many years, universities developing new programs for initial TVET teacher education to tackle this problem. However, this has led to a non-transparent structure of degree programmes on offer. This article presents, as a result of a qualitative research approach, a typology of initial TVET teacher education programmes in order to provide more transparency in the TVET teacher education system. Basis for the presented typology are the information provided by all universities in Germany (N=52) who offer vocational teacher education programmes. These information were then run through a criteria matrix, resulting in a typology of seven different study models. In conclusion, we can see that traditional models, while being offered the most in German universities, are challenged by a lot of different study models who are generally not considered traditional.

Key words: typology, TVET, teacher education.

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1. Introduction

Some scholars argue that the comparison of TVET education programs is hardly possible, internationally as well as nationally (Spöttl and Stolte, 2022). In this paper, however, we will present a typology of initial TVET teacher education in Germany that is in fact the result of the comparison of every study program offered by a university in Germany.

The discourse of TVET teacher education research was and is largely determined by the shortage of teachers at vocational schools in the industrial-technical subjects, but also, for example, in the vocational subjects of social pedagogy or nursing science (KMK, 2022, p. 28) and seems to be at an argumentative impasse: The reason for the shortage of teaching staff and low student numbers is often seen as the multitude of different study models and access routes, in that qualification and education paths for the teaching profession at vocational schools are characterised by a high degree of confusion (Seidel and Wemme, 2011, p. 226). Conversely, it is precisely this lack of students at the universities that is responsible for the structural heterogeneity of the TVET teacher education programmes, in that the universities try to increase the attractiveness of their study programmes through alternative study models (Frommberger and Lange, 2018, p. 13).

In fact, there has been a broad differentiation of TVET teacher education programmes in recent years: In addition to the university-based regular model (Bals et al., 2016, p. 8) of TVET teacher education, consisting of a teaching-related, undergraduate Bachelor's programme and a subsequent consecutive Master's programme at a university, there have also been cooperation models since the 2000s in which universities cooperate with universities of applied sciences (Faßhauer, 2012, p. 283). As a result of the amendment to the KMK Framework Agreement in 2016, it is also possible to design Master's degree programmes for graduates of subject-specific Bachelor's degree programmes without a teaching profession reference (KMK, 2016, p. 3). As a result, more and more locations have since offered teaching-related Master's degree programmes that build on Bachelor's degree programmes without reference to the teaching profession, that is, those whose curriculum is primarily made up of (subject) didactic and the curriculum is primarily composed of (subject) didactic and educational science content as well as subject science content from a second subject.

Against this background of these structural developments and with regard to the chicken-and-egg problem within the discourse on the shortage of teachers in TVET, this article will first take stock of the study structure in Germany for the TVET teaching profession and, building on

this, develop a typology of study models. The following objectives are associated with this typology:

- To increase transparency by systematically mapping and classifying the study programmes,
- Enabling cross-university comparability of different study programmes,
- Creation of common terminology for study models within the discipline of vocational education studies, and
- Fixing a reference and starting point for further development and research activities in the discipline.

2. Theoretical reference

In the pursuit of scientific insights, comparison plays a pivotal role, particularly within social and educational research. The practice of identifying, comparing, and typifying cases contributes to a structured comprehension of complex realities, facilitating hypothesis generation and testing. This journey is guided by the formation of types, a concept that finds its roots in Max Weber's ideal and real types, as well as Alfred Schütz's recognition of type formation as both a scientific methodology and a fundamental practice in social action. However, as also Max Weber pointed out, there is a strong connection between creating types and the context, especially the historical context of the research object. The researcher as well as the critic must have a thorough understanding of the context of the research object.

Therefore, in order to understand the presented typology, a thorough description of the German TVET System and the system of teacher education in Germany is needed, especially for an audience that might not be familiar with it. As for the latter, we put TVET in parentheses, as many characteristics also apply for teacher education for different school types, e. g. elementary school. Especially internationally, but also nationally the German TVET system is often reduced to the dual system and therefore functions as its most prominent representative. The dual system becomes a synonym for TVET in Germany. However, this often leads to a oversimplified understanding about the TVET system in Germany. Teachers at vocational schools, however, do teach at various levels, thus their training is not limited to aspects of the dual system.

In fact, one of the largest part of the TVET system is the so-called transitional system (Übergangssystem). It actually comprises of different schools, which vary from state to state in Germany. The transitional system is designed for pupils who completed their compulsory

general education after 10th grade, but still have to complete the part-time compulsory education for the following two years. Usually, schools in the transitional system prepare pupils for an apprenticeship. Other types of schools within the TVET system are further secondary schools, where pupils can obtain an entrance qualification for higher education. It should be clear that the work of a TVET teacher in Germany is highly challenging due to this enormous gap of intellectual level.

In the first sub-section of this chapter, we will discuss typologies and research that has typologies as a goal generally. Although the work of TVET teachers in Germany, as we have seen, is not limited to the dual system, we will present it quite detailed in the section 2.2. The dual system is still the largest sub-system within the TVET system and thus TVET teachers do most of their work here (Frommberger and Lange, 2020, p. 520). Furthermore, a thorough discussion about historical developments might support a better understanding of the demands on TVET teachers. In the last sub-section of this chapter, we will present and discuss the (TVET) teacher education system in Germany.

2.1 Challenges and critique of the concept of types in social sciences

The central foundations for the development of the concept of types in the social sciences lie in the differentiation between ideal types and real types introduced by Max Weber at the beginning of the last century (Kelle and Kluge 2010, p. 83; Schmitt-Hertha and Tippelt, 2011, p.25). Additionally, the sociological analysis of type formation by Alfred Schütz plays a crucial role. Schütz not only understood the formation of types as a scientific method but also as a fundamental everyday practice of social action (Kelle and Kluge 2010, pp. 83-84; Promberger 2011, p. 8; Schmitt-Hertha and Tippelt 2011, pp. 24-25).

In social and educational research, the theoretical structuring of empirical data through the development of typologies serves the dual purpose of gaining knowledge and deriving strategies for action (Schmitt-Hertha and Tippelt, 2011, p. 23). Within vocational education studies, typologies are primarily utilized in international comparative vocational education studies to categorize and compare TVET systems in different countries (Pilz, 2017). From a research methodological perspective, typologies are created through grouping processes using selected characteristics. The goal is to ensure that individual types exhibit both the greatest possible internal homogeneity and the greatest possible external heterogeneity. In other words, during typologizing, elements within individual types should be as similar as possible, while the types within the typology should differ from each other as much as possible (Kelle and Kluge,

2010, p. 85). To identify actual similarities (internal homogeneity) and differences (external heterogeneity) between elements clearly and to ultimately characterize resulting types, the analysis must be based on specific features and criteria (Kelle and Kluge, 2010, p. 93).

However, the development of types in research is not without its challenges. The risk of oversimplification and the potential imposition of preconceived categories on complex social realities demand a reflexive and critical approach (Frommberger and Porcher, 2023). Additionally, the evolving nature of social phenomena underscores the importance of adapting typologies to changing contexts.

Fundamentally, typologies can never picture the reality as it is, since the elements that constitute a type only are akin rather than resemble. Furthermore, typologies are only intended for a section of reality, but there is always the danger that they will be absolutised and applied to other, related sections (Kluge, 1999, p. 24).

Overall, typologies in empirical social research prove to be a useful but also critiqued method. To ensure the validity and reliability of results, it is important for researchers to be transparent about their methodological choices, consider alternative explanations, and acknowledge the limitations of their typology formation. We aim to meet these standards in general but will provide more explicit details in Chapter 3.

2.2 The dual system

In the scholarly literature on TVET, the central characteristic of the dual system is usually identified as the existence of two places of learning, the training company and the vocational school (Arnold and Gonon, 2006, p. 101; Rebmann et al., 2005, p. 8; Schelten, 2004, p. 64). However, the word meanings of the two terms "dual" and "system" cannot only be applied at the level of company practice on the one hand and theoretical contents of vocational school instruction on the other, but also concern economic and political power constellations at higher levels (Greinert, 1995, p. 21; Harney, 2006, p. 232).

With the differentiation according to places of learning, legal (responsibilities of the federal government and the Länder), institutional (public and private sponsorship and funding) and didactic methodological (theoretical and practical content as well as systematic and systemic learning) dualities are also included or created. The reason for these diverse dualities is of a regulatory nature, because the dual system is a mixed system "of state, market and corporatist [control] elements" (Kutscha, 1992, p. 149). State regulation takes place through the Vocational Training Act and through federal legal ordinances for the company-based part of training, as

well as through school laws and curricula of the Länder for teaching at vocational schools. Market regulations result from training in private companies, which decide on the award of private-law vocational training contracts. Furthermore, corporatist regulation takes place through chambers and social partners. As self-governing bodies of the economy, the chambers supervise the implementation of vocational training and regulate the conduct of final examinations. Employers' associations and trade unions are involved as equal partners in the development of training regulations (Kutscha, 1997, pp. 141-142).

The first contours of dual vocational training can be discerned at the end of the 19th and beginning of the 20th century (Greinert, 1995, p. 35). At that time, society was affected by a social and economic structural change as a result of a phase of depression ("Gründerkrach 1873" and subsequent "Gründerkrise"), to which politicians in Germany reacted with fundamental changes in economic policy (Greinert, 1995, p. 35). Due to the transition to mass production, the associated increase in industrial workers and the trade regulations of the North German Confederation passed before the economic depression in 1869, in which the apprenticeship as a traditional form of training was abolished, the crafts increasingly found themselves in an economic plight (Greinert, 1995, pp. 36-37).

As a reaction to the threat to the former middle classes (crafts, small trade, small farming) and in order to protect them from proletarianisation, a series of amendments were passed in favour of crafts and the retail trade, the most important of which was the Trade Regulation Amendment of 1897, which can be seen as the foundation stone of dual vocational training (Greinert, 1995, pp. 38-41). This law enabled the establishment of compulsory guilds as well as the establishment of chambers of crafts as self-governing bodies under public law, which were to form an authority that went beyond the professional interest of the guilds. Their tasks were to organise and supervise the training and examination of apprentices (Greinert, 1995, p. 45). With the so-called "small certificate of competence" of 1908, which tied the entitlement to train apprentices to the possession of a master craftsman's title, the ideal-typical structuring of apprenticeship training into the stages apprentice - journeyman - master craftsman became established (Blankertz, 1979, p. 276; Greinert, 1995, p. 46).

Subsequently, as a result of changing qualification requirements, a separate training model developed in industry alongside the traditional craft-based vocational training (Greinert, 1995, p. 70). This training model was characterised by three dimensions, an institutional one (training workshop and factory school), a methodological one (standardised courses and teaching materials) and a vocational system dimension (occupational profile, training plan and

examination requirements) (Greinert, 1995, p. 70). Thus a new type of qualification, the skilled worker, was created by the German employers' associations of the metal and electrical industries and other branches of industry (Greinert, 1995, p. 68). It was not until 1938 that a decree by the National Socialist government of the time also legally demarcated the industry from the crafts and the skilled worker examination was equated with the craftsman's journeyman's examination (Greinert, 1995, p. 68).

The conditional factors that became the trigger for the economic middle class policy at the end of the 19th century also had an effect on the development of the so-called Fortbildungsschule, which is considered the precursor of today's vocational school (Greinert, 1995, p. 46). With the beginning of the labour movement during the industrialisation of Germany in the second half of the 19th century, many young workers and apprentices in particular became members of a trade union and the socialist party. This development was to be countered by compulsory schooling in the training schools, which had already existed since the 18th century, by influencing the ways of thinking and political convictions of the young workers (Greinert, 1995, pp. 47, 50; Greinert, 1999, p. 44).

Accordingly, there can be no talk of a duality of vocational training; rather, vocational training was the sole task of the companies (Blankertz, 1979, p. 277). The most important founder, representative and reformer of the further education school movement in this context was Georg Kerschensteiner, who at the turn of the century developed a vocational school theory that proclaimed political and pedagogical education for and through the occupation (Greinert, 1995, p. 56). He was thus still committed to the political consciousness-raising of working-class youth, but he shaped the decisive character of the vocational school, which was also named as such at the Reich School Conference in 1920, by placing the didactic orientation on the occupation and the importance of the occupation as a medium for the formation of people and character in the foreground (Blankertz, 1979, pp. 279-280). At the end of the 1930s, the National Socialists regulated decisive features of the vocational school system, such as sponsorship and financing, compulsory vocational education, the content of instruction and its temporal scope. With changed ideological and political intentions, this vocational school model was adopted in West Germany after the war (Greinert, 1995, pp. 84-85).

After World War II, the attempt initiated by the trade unions to draft comprehensive legal regulations for vocational training was initially stopped by the Crafts Code (Handwerksordnung) passed in 1953, which provided for vocational training regulations exclusively for the crafts sector (Greinert, 1995, pp. 84-85; Greinert, 2006, p. 504). In 1959, the discussion was taken up

again, again through the initiative of the trade unions, and finally the Vocational Training Act (Berufsbildungsgesetz, BBiG) was passed in the Bundestag at the end of the 1960s (Greinert, 1995, p. 95-96). The BBiG ended the legal fragmentation that had existed until then in in-company vocational education and training and for the first time a uniform overall regulation for vocational education and training in companies was created at the federal level (Greinert, 2006, p. 504; Lipsmeier, 1994, p. 15).

With the passing of the Vocational Training Act in 1969, legal competence passed from the traditional right of disposal of the chambers to the state and the unilateral influence of employers on vocational training was extended to the federal government, the Länder, trade unions and the vocational school teachers, who are involved in the planning, implementation and control of vocational training (Greinert, 1995, p. 112).

As a result of a reform discussion concerning the entire German education system, the dual system was also exposed to massive criticism as early as the beginning of the 1970s. The starting point was a debate that had been going on since the 1960s about the "German education catastrophe" (Picht, 1964), postulated by the backwardness of the German education system compared to other industrial nations, and about the demand "education is a civil right" (Dahrendorf, 1965), which drew attention to the social inequality of educational opportunities and reproduction through the education system. The dual system touched this debate mainly at two points of attack: On the one hand, the traditional separation of general and vocational education within the German education system was seen as the reason for a social division of the population and, on the other hand, the deficient training and qualification practice of the dual vocational training system came under criticism for not having adapted to economic and technological changes (Greinert, 1995, pp. 105-106).

The German Education Council commissioned by the Bundestag as a result of this debate then recommended a number of reform proposals. As early as 1969, a few months before the BBiG was passed, it noted that apprenticeship training as a whole was characterised by "considerable inequality in the efforts and performance of the individual companies" (Deutscher Bildungsrat, 1969, p. 15) and that apprentices without a theoretical and pedagogical foundation were not receiving adequate preparation for the demands of working life (Deutscher Bildungsrat, 1969, pp. 15-16), as they would be "called upon to an unjustifiable extent to perform unqualified routine, auxiliary and secondary tasks" (Deutscher Bildungsrat, 1969, p. 15). The proposals, which were later concretised in a curricular framework, were intended, among other things, to interlink vocational and general education qualifications and content (Deutscher

Bildungsrat, 1974) and to make vocational training courses more permeable, for example in the form of access to the higher education entrance qualification via vocational specialist training (Deutscher Bildungsrat, 1974, pp. 130-131). However, the implementation of these reform proposals as well as that of a draft amendment to the BBiG ("Marking Points" of 15.11.1973), which was intended to strengthen state responsibility for vocational education and training, then failed due to the resistance of company representatives and the onset of the global economic crisis (Greinert, 1995, pp. 106-107).

In the 1980s, the situation of the dual system was primarily characterised by a shortage of training places and the reorganisation of vocational education and training (Stratmann and Schlösser, 1990, p. 245). Rising youth unemployment due to the growing demand for training from baby boomers resulted, for example, in the promotion of extra-company training centres but also in integrating measures for vocational preparation (Lipsmeier, 1994, p. 32; Stratmann and Schlösser, 1990, pp. 249-250). Furthermore, a reorganisation of the metal and electrical occupations took place in the 1980s, which provided important impulses with regard to didactic-methodological reforms in the direction of action-oriented teaching for the entire vocational education and training system (Stratmann and Schlösser, 1990, p. 255). This set in motion a development also at the curricular level, which culminated in the mid-1990s in a restructuring of the framework curricula in the vocational schools according to learning fields and the didactic concept of action orientation as well as in a new guiding principle (vocational action ability or competence).

The situation and development in the 1980s and 1990s led to an increasing discrepancy between the supply of and demand for training places. The situation and development in the 1980s and 1990s led to an increasing discrepancy between the supply of and demand for training places, so that the dual system lost influence in favour of the full-time school system and the transition system (Baethge et al., 2007, p. 20; Dehnbostel, 2009, p. 187; Euler, 2009, p. 87). In order to be able to react to these developments, the BBiG was amended in 2005. The aim was to stabilise the competitiveness of the German economy against the background of increasing globalisation and an increasingly differentiated world of work that is subject to constant change (Sondermann, 2005, p. 6). The most important innovations, compared to 1969, concern and include:

A reformulation of content - the aim of vocational education and training is to impart vocational competence to act (§ 1 BBiG 2005) and to expand the content of the training

occupational profile (knowledge and skills) to include the specification of skills (§ 5, para. 1 of BBiG 2005).

- An internationalisation - temporary sections of vocational training (max. 25% of the training duration) can be completed abroad. They are treated as part of vocational training (§ 2, par. 3 and § 76, par. 3 BBiG 2005).
- A right of vocational school teachers to have a say - voting rights in the vocational training committee when it comes to matters of vocational preparation and vocational training that have a direct impact on school-based training (§ 79 Para. 6 BBiG 2005).
- The extended final examination - is included as an equivalent standard case (§ 5 par. 2 no. 5 and § 48 par. 2 BBiG 2005).
- Admission for externs - minimum period of relevant professional activity is reduced from 2 years to 1 ½ years (§ 45 Para. 2 Sentence 1 BBiG 2005) and periods of professional activity also count as training periods in another relevant training occupation (§ 45 Para. 2 Sentence 2 BBiG 2005).
- Crediting of prior vocational training towards the training period (§ 7 BBiG 2005). Cooperation between schools and companies as a place of learning is explicitly recognised (§ 2 Para. 2 BBiG 2005).

The amendment to the BBiG 2005 thus marks the provisional conclusion of the development of the dual system in a historical context.

2.3 Teacher education in Germany

Unless the *Basic Law for the Federal Republic of Germany* awards legislative power to the federal government, education is a legislative matter of the states, causing a diverse and heterogenic structure of the educational system. “[T]his applies to the school sector, the higher education sector, adult education and continuing education. Administration of the education system in these areas is almost exclusively a matter for the Länder [states]” (KMK, 2021, p. 23). This also applies to teacher education. To emphasize this aspect: every single state within the Federal Republic of Germany has the right to legislate on issues of teacher education, develop policies, define standards, and implement models and other strategies. Logically, teachers in Germany are, generally speaking, civil servants and are employed by the individual states.

However, the situation is not as chaotic as it seems. The *Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany* (Kultusministerkonferenz, usually abbreviated with KMK) is a voluntary assemble of the sixteen Ministers of Education. Its goal is to ensure the necessary degree of commonality in education, science and culture in matters of nationwide importance. The KMK is not part of the federal government, and its directives must be turned into state law.

The English language knows the difference between pre-service (or initial) and in-service teacher education. In Germany, the teacher education system is divided into three so-called “phases”:

- Phase 1: Study programs at universities. This translates into pre-service or initial teacher education.
- Phase 2: Preparatory service or teaching practice. Students who held a Master’s degree in teaching enter a 18-months preparatory service (Referendariat). This service takes place at two venues: a school and the teacher’s training college.
- Phase 3: Continuing education. This translates into in-service teacher education. Teachers who finished the preparatory service are asked to participate in.

3. Methodology

In the following sections, we will embark on an exploration of the study’s approach, delve into the study population and collection techniques, and subsequently, engage in a detailed analysis of the findings. We aim to unravel the complexities of comparative methodology in the pursuit of enriching our understanding of educational systems.

3.1 Approach

Comparison is intentionally employed as a means of acquiring scientific knowledge, giving rise to a distinct comparative approach, in our case, a qualitative approach, as we intentionally base our case selection on criteria. Conversely, at the pre-scientific level, the characteristics of the objects being compared are not presented in a nuanced manner; instead, objects are frequently and hastily analogized with others that exhibit convergences or divergences, mainly for rhetorical purposes. It is often assumed that ‘comparability’ necessitates similarity. However, contrary to the pre-scientific notion that ‘one cannot compare apples with pears’, scientifically driven comparisons yield particularly intriguing and insightful findings by examining differences.

The critical factor is not similarity but the establishment of relationships between the objects of research, typically with regard to a comparison criterion or ‘tertium comparationis’. This term refers to the overarching aspect that should guide the comparison. In this regard, the comparative method's core purpose is to facilitate understanding by precisely ‘breaking the “natural” bond of comparison to preceding similarity’ and ‘transferring the judgement of sameness from the object to the relation’³ (Schriewer, 1987, pp. 79-80).

Even without an international or cross-border perspective, comparison in scientific analysis is crucial for knowledge acquisition. Case analysis, case construction, case comparison, and typification are fundamental techniques for generating scientific knowledge. (Social) science aims to describe and explain social realities. Identifying and comparing cases and types helps to structure information and improve the understanding of reality based on it. Complexities are thus reduced to facilitate insight and hypothesis formation or testing. In this regard, type and model formation and typologies function as ‘heuristics of theory formation’⁴ (Kelle and Kluge, 2010, p. 11).

Central foundations for the development of the concept of type in the social sciences are the differentiation of ideal types and real types introduced by Max Weber at the beginning of the last century (Kelle and Kluge, 2010, p. 83; Schmitt-Hertha and Tippelt, 2011, p. 25) as well as the sociological analysis of type formation by Alfred Schütz, who understood the formation of types not only as a scientific method but also as a basic everyday practice of social action (Kelle and Kluge, 2010, pp. 83-84; Promberger, 2011, p. 8; Schmitt-Hertha and Tippelt, 2011, pp. 24-25).

In social and educational research, the theoretical structuring of empirical data through the development of typologies serves on the one hand to gain knowledge, but on the other hand also to derive strategies for action (Schmitt-Hertha and Tippelt, 2011, p. 23). Within vocational and business education, typologies are mainly used in international comparative VET research in order to be able to classify and compare the VET systems of different countries accordingly (Pilz, 2017). From a research-methodological point of view, typologies are created on the basis of grouping processes using selected characteristics, in which the individual types exhibit both the greatest possible internal homogeneity and the greatest possible external heterogeneity among themselves. This means that in a typologisation the elements within the individual types should be as similar as possible, but the types within the typology should differ from each other

³ Translated by the authors

⁴ Translated by the authors

as much as possible (Kelle and Kluge, 2010, p. 85). In order to be able to identify the actual similarities (internal homogeneity) and differences (external heterogeneity) between the elements as clearly as possible and to finally characterise the types determined from this, the analysis must be based on certain features and criteria (Kelle and Kluge, 2010, p. 93).

3.2 Study population

As a basis for the development of the typology of study models in the first of all, a survey of the study structures in Germany was carried out of the study structures in Germany. For this purpose, all websites of the study study locations offering vocational teacher training programmes (at the time of the survey in summer 2021, there were 52 university locations). in the sense of a complete survey. In addition, in the event of ambiguities, e.g. regarding question of admission requirements, for example, those responsible for the study programmes were experts were consulted.

3.3 Collection techniques

On the basis of the information provided on the websites in the form of study programme descriptions and regulatory documents, such as admission regulations, examination regulations and module handbooks, the study programmes recorded were classified in a simple analysis grid. Here, criteria were defined that relate to the federal state, the vocational specialisations and general education teaching subjects that can be studied, the necessary admission requirements as well as the academic degree to be obtained and the associated entitlement to enter the preparatory service.

For the typology to be developed from this data, it was first necessary to clarify two questions that should be asked before any typologisation (Kelle and Kluge, 2010, p. 86):

- What elements or cases are the types about?
- What are the characteristics or features by which the types can be grouped and distinguished from one another?

Due to the fact that the study programmes offered by higher education institutions differ greatly from one another within individual federal states and that individual locations also frequently offer different study programmes, in clarifying the first question, study programme models should first be considered as "cases" and grouped into types, rather than federal states or locations. However, this approach proved not to be fruitful upon closer examination of the

individual cases, since a corresponding grouping according to study programme models would not have reflected the actual diversity of study options and the differences that constitute them. According to Kelle and Kluge (2010), for example, detachment from the case originally defined for data collection is necessary when a data collection case can be assigned to several types (Kelle and Kluge, 2010, p. 86). In the present typology development, the situation arose accordingly that different access options exist for one and the same study programme and that this had to be assigned to several types as a result. In the typology presented here, it should therefore be noted that the individual types do not represent study programme models, but rather study models. In the following, study models are understood as models that, from an output-oriented perspective, represent study options that qualify for the preparatory service and can differ in terms of their formal structure and organisation. In clarifying the second question, the characteristics are to be defined with the help of which similarities (internal homogeneity) and differences (external heterogeneity) between the "cases" can be recorded and with the help of which the identified types can be characterised. This also includes determining the characteristics (Kelle and Kluge, 2010, p. 91).

3.4 Analysis processing

After an extensive research, we were able to identify 52 universities in Germany to offer study programs in pre-service VET teacher education. We studied the relevant documents related to the programs that are provided on the universities' website. These documents provide information on curricula, examination regulations, and regulations on access and admission to the study programs. In order to prevent any misconceptions, we contacted the assigned study program coordinator to deal with any remaining questions regarding the study program.

After this first step of our research, we were able to identify five characteristics which help us to distinguish the numerous approaches of offering pre-service teacher education. The five characteristics are:

- Degree structure
- Entry requirements
- Curriculum
- Consecutive/Non-Consecutive
- Cooperation

Degree structure refers to the general logic of academic organisation in Germany. As for teacher education, it is possible to study in Bachelor's and Master's degree programs and the traditional State Examination program (Erstes Staatsexamen). After Bologna, the vast majority of study programs are Bachelor's or Master's degree programs. Please note that, at least in most cases, you have to have a Master's degree in teacher education in order to work as a teacher. Before Bologna, almost all study program in teacher education were organised as State Examination degree programs. Without going in much detail, the main difference between Bachelor's/Master's and State Examination lies within the fact that after three years, students obtain their first academic degree (Bachelor's), and after two more years their second (Master's) which allows them to enter the second phase of teacher education. In a State Examination program, students study in a continuously organised program.

Entry requirements refers to the access and admission to the Master's degree program. With this characteristic, we take the perspective of the Master's degree program and ask: What Bachelor's degree must applicants held in order to get access to this Master's degree program? We then distinguish between two types of Bachelor's degree programs: teacher education programs and non-teacher education programs. A Bachelor's degree in teacher education exists when classes in subject areas (i.e. mechanical engineering), didactics, and pedagogy where offered as well as mandatory student teaching, that is school internships.

Curriculum refers to structure of the Master's degree program and its targeted group of students. Very roughly speaking, we can distinguish between two types of Master's degree programs: One that are designed for Bachelor's degrees in teacher education and one that are designed for Bachelor's degrees in any other areas than teacher education, i.e. mechanical engineering, electrical engineering, chemical engineering etc. Speaking of the latter, we can imagine students who do not want to become teachers in VET initially, but rather working as engineers, in management or elsewhere. However, sometimes people want to change their career paths. Some Master's degree programs in teacher education are specifically designed for this target group. They do not bring all credits in the above mentioned classes from their Bachelor's, but can still become teachers in VET without studying a Bachelor's again.

The second last characteristic, *Consecutive/Non-Consecutive*, is strongly linked to the aforementioned characteristic. However, while *curriculum* refers rather to the target group, this characteristic deals with the time needed to finish both Bachelor's and Master's. The Framework Act for Higher Education, which is a federal law, defines that consecutive Master's

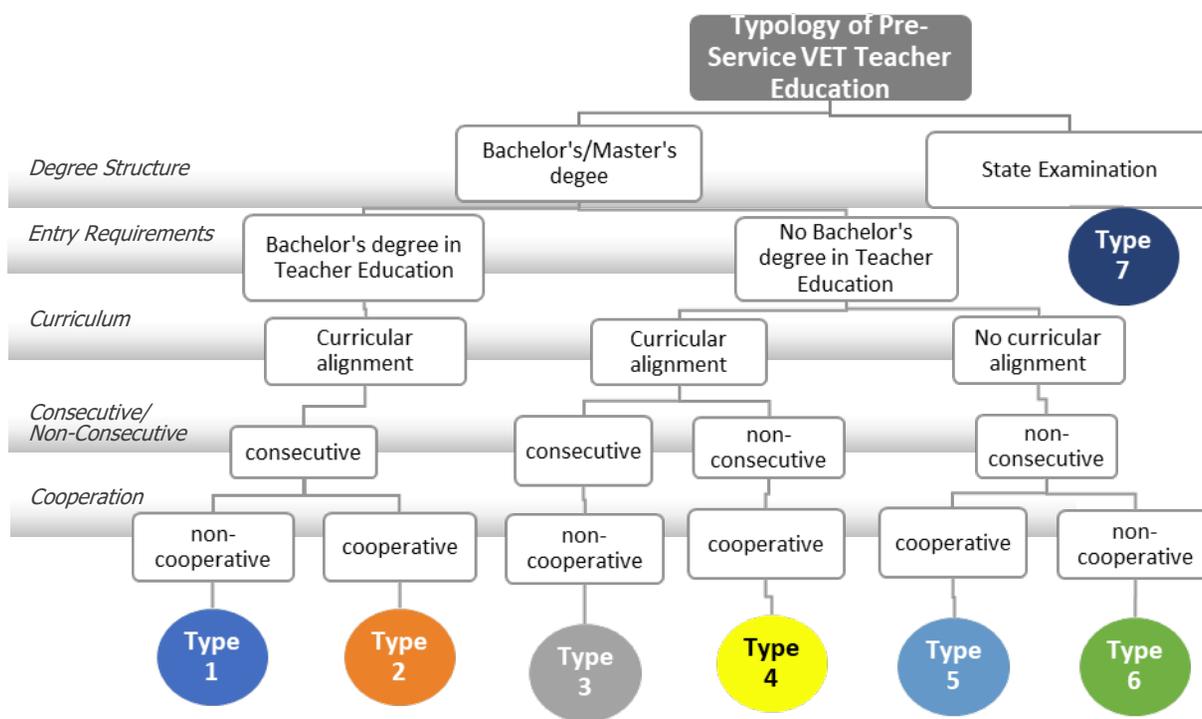
degree programs must be no longer than one to two years. A Bachelor's degree program must be no longer than three to four years, which makes a total of five years for both degrees.

Cooperation refers to the participation of other institutions in pre-service teacher education. These institutions can be other universities, vocational schools or teacher's training colleges. Sometimes, universities agree to cooperate when they cannot offer all classes relevant to teacher education study programs, i.e. classes in subjects such as engineering or the humanities, pedagogy, or didactics.

4. Results

Applying these characteristics to our research, we were able to identify seven types of study models. The pathway to each individual type is illustrated in Figure 1. We will discuss each type with adequate depth in section 4.1, followed by a discussion about these results in section 4.2.

Figure 1
The typology of initial TVET teacher education in Germany



Source: The Status Quo of TVET Teacher Education in Germany (Trampe and Porcher, 2022, p. 80)

4.1 The individual types

Type 1: Bachelor's/Master's model: consecutive approach

The first type could also be described as the standard model. Its major characteristic is the amount of classes dealing with pedagogical or didactical questions, that is, both Bachelor's as well as Master's programs offer a degree in teaching. Both programs are complementary designed and to be studied in sequence. Universities require applicants to have earned a Bachelor's degree in teaching.

Type 2: Bachelor's/Master's model: consecutive + cooperative approach

What was said for type one applies for this model as well. The only difference between type one and two lies in its organization. Usually, students apply for a study program at a university, however, when a university cannot offer all aspects of the program (i.e. classes in engineering, education etc.), they agree to cooperate with another university, often with a university of applied sciences⁵. We regard a cooperation when one of three pillars of teacher education is studied at a different institution than the university offering a Bachelor's or Master's program.

Type 3: Career change model: consecutive approach

This study model is specifically designed for applicants with a Bachelor's degree that is not affiliated with teaching. The applicants may hold a Bachelor's degree in engineering, nursing science, or electrical engineering. In the Master's program, students do not study a vocational subject, as they completed the mandatory requirement of credit points of this column (see chapter 2) with their Bachelor's. Instead, they focus on their non-vocational related subjects, i.e. English, Maths, or P.E., and on lectures and seminars in pedagogy and didactics. The general idea of this study model is to give students that did not want to become TVET teachers initially the opportunity to easily change their careers without circumstances.

Type 4: Career change model: dual approach

What was said about type three also applies for this study model, with the exception that students already work at a vocational school during their studies. This practical experience is intentionally integrated in this study model. After getting their Master's degree, the preparatory

⁵ In German these schools are called Fachhochschulen, in the UK the former Polytechnics were similar to the concept of Fachhochschulen

service may shorten. There is also a variety offered where the preparatory service is systematically integrated, meaning that students simultaneously getting their Master's degree and finish the preparatory service. Due to this aspect, this type cannot be regarded as consecutive, since students may need more than two years to complete their studies.

Type 5: Concurrent study model

In this study model, students a Master's program in teacher education is generally open for students who only hold a Bachelor's degree in non-teaching related subjects. This means that the curriculum is not specifically designed for this target group, as it is the case with type three. Instead, students have to accept that they might need more time to complete the Master's program, as they are given conditions with their admission to the Master's program, i.e. additional courses in pedagogy. Additionally, this study model meets the criterion of *cooperation*. Application is limited to students of pre-defined universities, usually universities of applied sciences. The institutions usually sign an agreement to cooperate in order to limit the conditions given to students after their admission. Since this model might be confusing, we provide an example: Aachen University offers a Master's program in TVET teachers education. In order to challenge the high demand in various vocational subjects, they signed an agreement with the universities of applied sciences in Aachen, Cologne, and Niederrhein. Students of engineering programmes from these universities, and only these universities, are granted admission to the Master's program in TVET teachers education without a detailed case-by-case review of their Bachelor's degrees. However, they have to deal with their given conditions and cannot complete the Master's program in two years.

Type 6: Case-by-case review model

What was said about type five also applies for this study model. The major difference is that there is no cooperation agreement in play. That said, it is obvious that the universities who theoretically open their Master's program in TVET teacher education for applicants without a Bachelor's degree in TVET teacher education evaluate the application on an individual basis.

Type 7: State Examination model

The State Examination is a degree program that is unique to Germany and is offered by certain universities in the country. The degree is awarded to students who have completed a program in specific fields such as law, medicine, and teaching. The State Examination consists

of two parts: the theoretical and practical part. The theoretical part of the examination usually involves written exams and/or oral exams, which test the student's knowledge of the subject matter. The theoretical part of the exam is administered by the university and is designed to test the student's academic knowledge. The practical part of the examination involves internships, clinical rotations, or teaching practice, depending on the field of study. This part of the exam is designed to test the student's practical skills and ability to apply their knowledge in real-world situations. The practical part of the exam is often administered by the relevant professional associations or regulatory bodies. After completing the State Examination, graduates are typically required to complete a period of practical training known as the "Referendariat." The length of the Referendariat varies depending on the field of study, but it typically lasts between one and two years. During this time, graduates work as trainees under the supervision of experienced professionals and gain practical experience in their chosen field. Once graduates have completed the Referendariat, they are usually qualified to practice their profession and are eligible for certification or licensing. This allows them to legally work in their chosen field in Germany.

4.2 Discussion

The typology presented is a synchronous inventory (as of June 2021) based on information specific to the universities on the respective homepages, such as programme descriptions and regulatory materials, so that regulations communicated beyond this medium may not have been taken into account. Furthermore, the identified study models and admission requirements at the individual locations cannot always be clearly and distinctly distinguished from one another and assigned to the different types. Figure 2 provides an overview of the types of study models currently offered at German higher education institutions in the area of vocational teacher training.

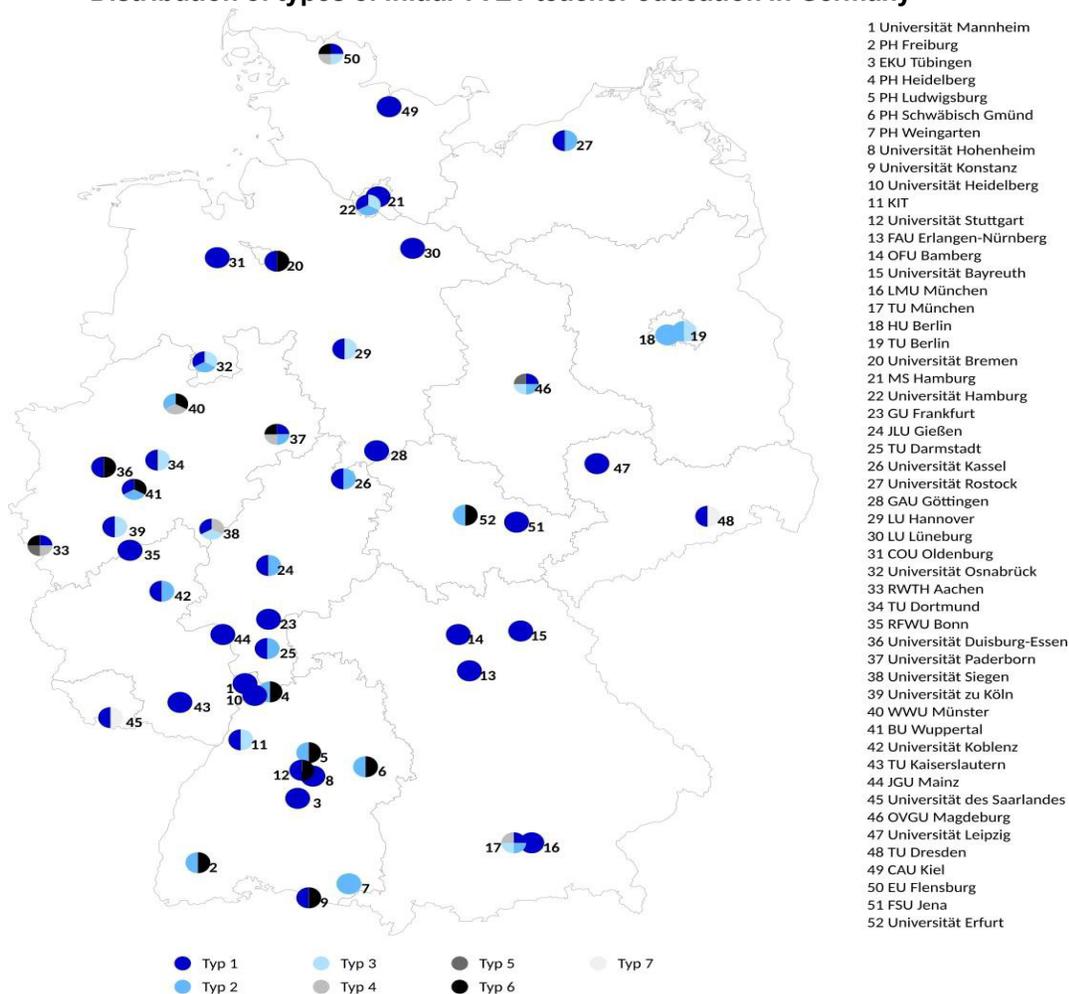
This shows that although the standard undergraduate consecutive model still dominates, an extremely differentiated range of study models for vocational teacher training has emerged in Germany in recent years - especially those study models that can be characterised by predominantly subject-oriented Bachelor's degree programmes without direct reference to the teaching profession. A numerical distribution of the seven types in Germany is given in table 1.

Many universities are offering more than one type of study model, leading to the assumption that they acknowledge that potential students of TVET teacher education come from various backgrounds with different interests and educational biographies. Students of

TVET in Germany are usually describes as an extremely heterogeneous group (Grunau and Jenert, 2021). Major characteristics are: slightly older than *traditional* students, obtained their university entrance qualification (i.e. A levels) not at an *Gymnasium*, but at vocational schools (see section 2) and usually completed an apprenticeship or a similar training and have professional experience (Grunau and Petzold-Rudolph, 2021, p. 1). The differentiation of study model of TVET teacher education seems to be an response these characteristics of the target group.

However, an important aspect of the discussion must be raised. We are referring to the aspect of quality standards within the TVET teacher education. To our knowledge, there are no studies examining the relationship between the training of teachers and the quality of their work. This cannot be surprising, as it is hardly possible to objectively define what a *good* teacher is. Thus, the debate on this issue is, at least in Germany, highly political. What was said about the shortage of teachers in the TVET system can also be said about the general education system (Bosen, 2023). However, a similar differentiation of study model in this field cannot be observed. Some states try to convince people working in different industries to become teachers, for example chemists that should teach chemistry at middle schools (so- called “Seiteneinsteiger”). But these programmes are highly controversial within the public debate due to concerns over the pedagogical and didactical skills of this target group.

Figure 2
Distribution of types of initial TVET teacher education in Germany



Source: TVET Teacher Education in Germany (Porcher and Trampe, 2021)

Table 1
Numerical distribution of types of initial TVET teacher education in Germany

Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7
47	20	11	7	2	14	2

Source: Elaboración propia

Similar concerns about the pedagogical personnel in the TVET system, however, cannot be observed. What might be the reason for this phenomenon? If we believe that a society shows its appreciation for the education system, and thus for future generations, through the demands it makes on education personnel, the enormous heterogeneity of study model in TVET teacher

education becomes questionable. Surely, teachers who took a different path other than the regular one does not necessarily mean that these teachers perform worse than their colleagues. The fact that there is this heterogeneity is more of a chance for educational politics: more research must be conducted in order to make valid arguments about teaching standards.

5 Conclusion

In the process of scientific knowledge, a typology is often regarded not as the final goal of knowledge, but as a typical, necessary intermediate step (Kelle and Kluge, 2010, p. 91; Promberger, 2011, p. 11). Accordingly, the identification of characteristic types of study models in the vocational teaching profession was initially based on the idea of creating an initial basis that could be used at the beginning of the study, to create an initial basis for resolving the confusion mentioned above in a typology.

The typology and the corresponding allocation of the locations to the types thus contributes to an increase in transparency for those interested in studying as well as for the interested professional public and furthermore offers a basis for cross-university comparisons of study programmes. The definition of the individual types also provides formal terms that can serve as a common basis of understanding within the disciplinary discourse in vocational education studies and in TVET teacher education research. The typology thus offers a variety of starting points for further development and research activities in the discipline, e.g. in the (re)conception of study programmes. It is also possible, for example, to carry out inventories on the basis of certain structural features or to compile samples for vocational teacher education research according to defined criteria, such as the vocational specialisation or the target group.

Logically, typologies represent an abstraction of reality and therefore reduce complexity. This is also the case for the typology of initial TVET teacher education presented here. In the research process, a lot of abstractions and simplifications have been made. Therefore, there are some edge cases when it comes to assigning universities and their study programmes to the types. Even more, when looking at an individual study programme in much detail, singular characteristics can be recognised. The presented typology cannot have the aspiration in meeting these singular characteristics.

Finally, it should be noted that the allocation of study programmes to the individual types can only be a snapshot, as developments in (TVET) teacher education policy are highly dynamic. Especially in times of teacher shortage, and due to the fact the German states have the competence to design their own teacher education policies, new models of initial TVET

teacher education may emerge within a year. The range of initial TVET teacher education therefore must be continuously monitored and analysed, for which the typology presented here is a useful tool.

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