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# **The Linkage Between the Education and Employment Systems: Ideal Types of Vocational Education and Training Programs**

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## **ABSTRACT**

In this article, we argue that every typology should be constructed in a systematic, transparent process. Moreover, to validate a typology's explanatory value, a typological approach must rest on a strong theoretical foundation. We both propose such an approach and apply it to construct three ideal types of vocational education and training (VET) programs. We build on Luhmann's theory of social systems, which helps elucidate the significance of the linkage between actors from the education and employment systems in VET. The first ideal type, with a maximal linkage, entails equal power-sharing between actors from the two systems. We expect such a VET program to have the most favorable youth labor market outcome. In contrast, the other two ideal types, in which only one system has all of the power, result in either undesirable outcomes, such as unemployment or skill mismatch, or missing access to further education.

*Keywords:* Vocational Education and Training, Education System, Social Systems Theory, Typology

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## INTRODUCTION

After the outbreak of the financial crisis in 2008, politicians and researchers ignited a growing interest in vocational education and training (VET) as a way of combating the deteriorating situation of young people in the labor market (e.g., ILO and OECD 2014). In many countries, the proportion of unemployed young people is extremely high despite near-universal access to education (e.g., Quintini and Martin 2006; Renold et al. 2014; for the US, e.g., Symonds, Schwartz, and Ferguson 2011). However, the recession not only led to a dramatic increase in young people's unemployment but also worsened their working conditions (Scarpetta, Sonnet, and Manfredi 2010; Pusterla 2016).

In contrast to general education, which is relevant for a wide range of jobs, and which particularly prepares students for further academic education, VET directly prepares young people for employment in a specific occupation or job (OECD 2004). However, despite this clear mission, considerable variation exists in VET worldwide (e.g., Biavaschi et al. 2012). The question therefore arises as to how one can compare VET around the world and bring its variations into a meaningful, systematic order. Such a comparison must entail an explanation of VET outcomes (e.g., the integration of young people into the labor market and the quality of their jobs), as the purpose of a typology is to order research entities based on the criteria that one can expect to lead to those outcomes (Doty and Glick 1994; Elman 2005).

This article develops an explanatory typology of VET by applying the concepts of ideal types and real types (Weber 1922, 1956 [1921/22], 1968). Whereas ideal types are heuristically derived pure types, they do not exist empirically but instead serve as benchmarks for the reality described by real types. Determining where real types deviate from ideal types can advance scholarly understanding of unfavorable youth labor market outcomes, such as unemployment and under- or over-qualification.

Much of recent literature on VET explores its worldwide variation (e.g., Brockmann, Clarke, and Winch 2008; Biavaschi et al. 2012; Dumas, Méhaut, and Olympio 2013). These studies analyze different aspects of VET, including pathways, programs, and curricula (Renold et al. 2016). Curricula are study courses that range from single modules to entire qualifications for occupations or jobs. Meanwhile, VET programs refer to the organizational characteristics of education and training and are composed of single or multiple curricula. Different VET programs together form what we call the “VET pathway” (Renold et al. 2016), which is part of the education and training system. When speaking of an “education and training system,” we refer to all general education and VET programs in a country, thus following the conventional use of the term. In contrast, we draw on the strict definition of social systems by Luhmann (1995) when speaking of the “education system.” We restrict our typology to VET programs at the upper-secondary education level, which generally corresponds to the final part of secondary education and has a typical entry age of 15 or 16 years (OECD 2004).

Classifications and typologies are widely accepted in comparative studies, including those on VET (e.g., Gangl 2001; Grollmann 2008; Busemeyer and Schlicht-Schmälzle 2014), and they vary extensively in their methodological approaches. The most prominent dimensions that scholars use to compare education and training are the institutional arrangements (e.g., Greinert 1988, Schelten 2004; Culpepper and Thelen 2008; Rauner and Wittig 2010), the educational providers or learning places (e.g., OECD 1985; Lauterbach 1995; Eichhorst et al. 2015), and the organizational structures (e.g., Allmendinger 1989; Müller and Shavit 1998; Greinert 2004).

Thus far, however, only a few scholars have gone beyond merely classifying VET or have attempted to build typologies that help to explain VET outcomes in the youth labor market. Four explanatory typologies (Allmendinger 1989; Hannan, Raffe, and Smyth

1996; Müller and Shavit 1998; Lavrijsen, Nicaise, and Poesen-Vandeputte 2014) exhibit good formal quality in their typological procedures: they are theoretically well founded and empirically applicable. To explain the labor market outcomes, these studies compare education and training programs along four dimensions: the existence of nationwide standards, for example, for teachers' training or curricula (Allmendinger 1989; Hannan, Raffe, and Smyth 1996; Müller and Shavit 1998); stratification (Allmendinger 1989; Hannan, Raffe, and Smyth 1996, Müller and Shavit 1998; Lavrijsen, Nicaise, and Poesen-Vandeputte 2014); occupational specificity (Müller and Shavit 1998; Lavrijsen, Nicaise, and Poesen-Vandeputte 2014); and the relationship between educational institutions and employers (Hannan, Raffe, and Smyth 1996). However, the four typologies include both general education and VET programs and therefore do not capture the constituent elements of VET or in-depth differences between VET programs.

We depart from the literature by constructing an explanatory typology of VET programs, a typology that offers a direction for further hypotheses on the causes of unfavorable youth labor market outcomes. This article focuses on the development of such a typological approach and the derivation of the ideal types. The criteria for the quality of typologies include a transparent, systematic procedure, a strong theoretical foundation, and empirical measurability (e.g., McKinney 1969; Kluge 2000; Bailey 2004; Fleiss 2010). In meeting those criteria, our typology also answers a call of the Organisation for Economic Co-operation and Development (OECD 2010) for a “comparative policy analysis, undertaken across a range of different countries to identify policy solutions that work” (40).

For a complete understanding of how VET programs can result in unfavorable outcomes in the youth labor market, we build on the theory of social systems (Luhmann 1995, 2009, 2013). For the analysis of VET programs, this theory points to the interface

between the education and employment systems (Eichmann 1989). As the constitutive element of VET programs is their connectivity to not only an educational career but also a professional one, VET programming needs to incorporate the expectations of the employment system and thus the intended effects of a VET program (Kelly 2009). Eichmann (1989) argues that if this structural coupling does not take place—that is, when the qualifications of graduates of VET programs do not meet the expectations of the employment system—problems with coordination and control might arise. Such problems are reflected in unfavorable labor market outcomes. According to the National Academies of Sciences (2017) and Symonds, Schwartz, and Ferguson (2011), the US “is not adequately developing and sustaining a workforce with the skills needed to compete in the 21st century” (National Academies of Sciences 2017:2).

Given this theoretical framework, our typology involves examining the linkage between actors from both the education and employment systems as the main comparative dimension. This linkage measures power-sharing between actors from the two systems—that is, the decision competences of each group of actors—along the three process phases of curriculum design, application, and updating (Renold et al. 2015, Renold et al. 2016). By taking this linkage to the extreme, we derive our ideal types of VET programs. Building on a curriculum theory (Kelly 2009) and other theoretical concepts (e.g., Billett 2011), we then identify the sub-processes (within each process phase), in which the two actors need to share power to prevent problems with coordination and control. Moreover, identifying the features in each sub-process allows us to empirically measure the power-sharing between actors from the two systems (Renold et al. 2016).

This article proceeds as follows: Sections 2 and 3 review the previous literature, and section 4 explains our theoretical framework. Section 5 proposes a typological approach that combines the theoretical framework and the analytical concepts of ideal types and

real types. Section 6 applies this approach to develop a typology of VET programs. Section 7 concludes and discusses the limitations and opportunities for future research.

### **TYPOLOGICAL APPROACHES AND THEIR QUALITY CRITERIA**

The tradition of typologies has a long history in the social sciences, especially in sociology (e.g., McKinney 1969). In this tradition, scholars have adopted different definitions of typologies, particularly in terms of distinguishing them from classifications. Moreover, discussions about the methodologies and functions of typologies have generated a vast amount of literature (e.g., McKinney 1969; Nowotny 1971; Bailey 2004; Kelle and Kluge 2010). Overall, scholars use typologies as constructs for reducing the complexity of social reality by putting this reality in a meaningful order.

To present the idea of typologies that we use in this article, we first need to define a number of terms with highly specialized meanings in typology theory. First, typologies compare research entities along categories, which are called “dimensions” (Bailey 2004), for example, a person’s socioeconomic status. Second, these dimensions build the axis of the “property space” (Lazarsfeld 1937). Third, by operationalizing the dimensions with measurable features, such as income and educational degree as features of socioeconomic status, we can locate each research entity in the property space (Barton 1955). Fourth, types are special compounds of the values of these features, and together, these types form a typology.

Bailey (2004) distinguishes typologies by whether they embrace heuristic, empirical, quantitative, or qualitative types. Heuristic types have a conceptual or theoretical foundation and are therefore derived deductively, as with ideal types. In contrast, empirical types derive from empirical data, as with real types. For the identification of qualitative and quantitative empirical types, numerous techniques are now available (e.g., cluster

analysis, case contrasting, and case comparison). These techniques identify groups of entities, the types, that have high internal homogeneity while maximizing the heterogeneity between them (Bailey 1994; Kelle and Kluge 2010; Kuckartz 2010). The construction of quantitative typologies in particular often suffers from a lack of empirical data.

In this article, we rely on a purposely restrictive idea of typologies, defining them as explanatory concepts, in contrast to purely descriptive classifications. Whereas classifications order research subjects with specific rules, typologies help scholars understand the outcomes of a research subject. Doty and Glick's (1994) definition highlights two important aspects of such typologies: They "identify multiple ideal types, each of which represents a unique combination of the... [features] that are believed to determine the relevant outcome(s)" (231).

First, according to Doty and Glick (1994), typologies also function as theories. This idea is in line with Weber (1922, 1956 [1921/22], 1968), who aimed to capture social reality with the help of theoretical and meaningful concepts, and therefore developed the concepts of ideal types and real types. Ideal types offer guidance for hypotheses about the conditions that created the research subject or for the consequences of its creation (Weber 1968). However, although resting on dimensions that exist in reality, ideal types occupy such extreme values of these dimensions that scholars rarely find them empirically (Weber 1968). These pure types instead serve as benchmarks for identifying similarities and deviations in empirical reality, which real types illustrate:

In its conceptual purity, this mental construct (Gedankenbild) cannot be found empirically anywhere in reality. It is a utopia. ... [R]esearch faces the task of determining in each individual case, the extent to which this ideal-construct approximates to or diverges from reality .... (Weber 1968:497)

Second, Doty and Glick (1994) highlight the importance of the features that scholars apply when constructing typologies. Elman (2005) points out that these features are extracted from the variables of existing theories or conceptual frameworks. Importantly, these features need to be relevant for the particular purpose of a typology (McKinney 1969).

For constructing a typology that offers directions for theorizing an empirical study, Bailey (2004) proposes a simple three-level model: Level A helps the scholar present the mental concept and thus construct the first image of the ideal type. Level B is the documentation level, where a scholar seeks to represent the typology in writing, whereas level C, the empirical level, includes the identification of the empirical cases of each of the constructed ideal types. According to Bailey (2004), qualitative typological procedures usually start with level A followed by B and perhaps C, whereas the quantitative ones proceed in reverse. Importantly, Bailey (2004) argues that each typological procedure needs to entail all three levels of his model; otherwise, understanding the underlying typological procedure is difficult.

Drawing on Bailey's model, we propose three formal quality criteria for developing a typology of VET programs. First, the typological procedure needs to be explicit and transparent, as does the reduction of a property space to the final typology (Lazarsfeld 1937). This argument for comprehensibility finds support from several scholars (e.g., McKinney 1969; Doty and Glick 1994).

Second, every explanatory typology needs to have a strong theoretical and conceptual background from which one can derive the comparative dimensions that explain the outcome. Thus the quality of each typology—relative to the form and content—depends largely on a clear definition and rationale for the chosen dimensions (Bailey 1994; Doty

and Glick 1994). In addition, scholars need to use these dimensions consistently throughout the description of the different types and discuss the theoretical importance of each feature (Doty and Glick 1994). To identify the features, scholars can either apply the theoretical knowledge they derive from existing theories or carry out an inductive analysis of the empirical material, as in grounded theory (Kluge 1999).

Third, building an explanatory typology should include documentation (level B) and empirical data (level C) in addition to the concept (level A; Bailey 2004). Thus, to operationalize the dimensions, scholars need to first break the comparative dimensions down into their features. Only then can scholars position real entities in the property space, group them by real types, or compare them to ideal types. Given that this empirical level is particularly important, as Weber (1922, 1956 [1921/22]) argues, social scientists need to use causal methods to empirically test their understanding of relationships of any kind.

In addition, the literature points to specific challenges in developing a VET typology, whether one analyzes VET curricula, programs, or pathways (e.g., Matthes 1992; Sung, Turbin, and Ashton 2000; Grollmann 2008). One major challenge lies in identifying the right dimensionality of VET, that is, finding the balance between too much complexity and too much simplicity (Elman 2005; Grollmann 2008). For example, putting too much emphasis on the cultural, historical, and societal contexts of VET programs might lead to an unmanageable (i.e., overly complex) typology (Sung, Turbin, and Ashton 2000).

A second challenge is what some scholars call the problem of “nostrification” (Grollmann 2008:254) in comparative studies, with scholars tending to associate their own culturally determined definitions and concepts with what they observe in other contexts (Matthes 1992; Grollmann 2008). According to Grollmann (2008) and Münch (1997), examples of nostrification are the studies that use combined school- and work-based VET programs as a benchmark without taking “into consideration the reconstruction of the

respective country-specific cultural and organizational-structural context” (Grollmann 2008:255, drawing on Georg 1997, Münch 1997). Brockmann, Clarke, and Winch (2008) argue that one should use transnational categories so that culturally distinct understandings and meanings of outwardly similar terms, such as skills or competencies, do not lead scholars to compare apples to oranges.

Critics argue that typologies have little explanatory or predictive power (Bailey 2004). Thus a third challenge lies in constructing typologies that not only have empirical patterns but also feature contextual meanings with implicit—and often hidden—explanations. Scholars therefore need to ensure that they consider only those dimensions that are causally related to the outcome of interest (Doty and Glick 1994; Kuckartz 2010).

In addition to the previously discussed criteria for quality, scholars need to consider these three challenges when constructing a VET typology. The section on our own typological approach explains how we pursue this goal. We also use these criteria in the following section to assess the quality of existing typologies.

## **VET TYPOLOGIES IN PREVIOUS RESEARCH**

As Petticrew and Roberts (2006), among others, recommend, we define three criteria for the selection of relevant literature while focusing on the issue of how to construct a VET program typology that helps scholars understand and explain different labor market outcomes related to VET.

Our first criterion entails the content of the studies. We restrict our literature review to studies that investigate VET in particular or to education and training studies that focus on labor market orientation, whether they investigate entire education and training systems or only specific aspects, such as VET programs. Although the comparison of entire “VET systems” dominates the scientific debate on VET, most scholars do not refer to the strict definition of social systems by Luhmann (1995) but instead to all VET programs

and pathways in a country. However, as this article examines VET at the upper-secondary education level, usually offered to young people aged 15-19, we exclude studies on higher or continuing education. Thus our second criterion defines the analytical unit. Our third criterion concerns the research design. We leave studies out that apply only comparative methods without developing typologies or classifications, such as the *Learning for Jobs* synthesis report of the OECD (2010). With these three criteria, we take our inspiration from various perspectives and approaches (mainly the educational sciences, political science, and sociology). In addition, we consider both theoretical and empirical studies, which can apply either quantitative or qualitative methods.

Broadly speaking, we group the literature into three different perspectives: the transition or labor market perspective, the institutional perspective, and the educational perspective. First, studies from the labor market perspective investigate education and training systems in relation to labor market structures (e.g., Gangl 2001; Rubery and Grimshaw 2003) and often overlap with research on the transition from education to employment (e.g., Raffe 1993). Studies from this perspective frequently differentiate between occupational labor markets (OLM), in which entry into the labor market is organized through an extensive VET pathway, and internal labor markets (ILM), in which labor market entry is unregulated (Marsden 1986). Another widespread approach is that of societal analysis. Its pioneers investigate differences in the work structures in France and Germany, resulting in the differentiation between qualificational and organizational spaces (Maurice and Sellier 1979; Maurice, Sellier, and Silvestre 1986). Whereas qualificational spaces emphasize specific vocational preparation and stratified education and training systems, organizational spaces focus on general education, with a low standardization of curricula.

Second, studies from the institutional perspective analyzed education and training either as part of a broader set of interconnected, complementary institutions, such as the varieties of capitalism approach (e.g., Culpepper and Thelen 2008; Iversen and Stephens 2008; Busemeyer and Trampusch 2012), or as part of a focus on the regulation and governance of education and training systems (e.g., Greinert 1988; Schelten 2004).

Various studies exploring the regulation or governance of VET each use the role of the state as their main comparative dimension (Greinert 1988; Schelten 2004). However, they usually do not discuss why this dimension is important when comparing VET. An exception is Busemeyer and Schlicht-Schmälzle (2014), who investigate the variation in VET governance with two dimensions that other studies had proved to be useful for describing different education and training systems: employer involvement and public commitment. Likewise, Rauner and Wittig (2010) identify four ideal models of VET governance based on two dimensions: the integration of the governance measured by the degree of coordination between different actors, and the mode of governance, which is either input- or output-oriented. However, the scope of studies from the institutional perspective is not confined to explaining the labor market outcomes of education but rather to its institutional setting and regulation.

Third, studies from the educational perspective analyze the different curricula, programs, and pathways in an education and training system, whether they belong to general education or VET. As these studies come closest to our research question, in this article, we review them according to the formal quality criteria that we defined earlier: the transparency of the typological procedure, its theoretical foundation, and its empirical applicability. A look at the methodology of studies from the educational perspective reveals that major work has been done in developing empirical classifications through which scholars typically compare selected countries (e.g., Lauterbach 1984; OECD 1985; Brockmann,

Clarke, and Winch 2008). However, the derivation of the comparative dimensions is often not an explicit part of the research process (Biavaschi et al. 2012; Dumas, Méhaut, and Olympio 2013; Eichhorst et al. 2015), and some studies do not even make these dimensions explicit (Green 1991, 1999; Münch 1997; Greinert 2004). The few theoretical studies of Deissinger (1995, 1998), Greinert (1995, 2000), and Clement (1996) restrict themselves to identifying abstract dimensions and theoretical types.

In studies from the educational perspective, we identify two prominent categories of comparative dimensions: different educational providers and learning places, and the stratification and standardization of education and training (see the overview table in the Appendix). Scholars analyzing educational providers and learning places of education and training programs use them as the only dimension (Lauterbach 1984, 1995; OECD 1985; Eichhorst et al. 2015) or as one of many (ILO 1998; Greinert 2004). These scholars generally distinguish between education and training programs that educational institutions or firms provide and between learning in a school environment or in the workplace. Although these empirical studies make their comparative dimensions transparent, they do not theoretically explain why these dimensions are important and thus propose descriptive classifications.

Drawing on Deissinger (1995, 1998), VET does not vary only in learning places, which is why scholars need to build multidimensional typologies. Deissinger (1995, 1998) proposes ideal types of “qualificational styles” (“Qualifizierungsstile,” Deissinger 1995:367) that describe the unique character of VET along three dimensions: the regulatory framework of the qualification process, the didactic-curricular orientation, and the role of the qualification process in socialization. However, his typology remains fairly abstract without showing how one could operationalize it for identifying real types.

Many studies emphasize the importance of the organizational structures of education and training systems, specifically stratification and standardization (Allmendinger 1989; Hannan, Raffe, and Smyth 1996; Müller and Shavit 1998; Greinert 2004; Lavrijsen, Nicaise, and Poesen-Vandeputte 2014). Whereas stratification refers to selection procedures (the extent and form of tracking), standardization measures the existence of nationwide standards for education and training. In addition, whereas Allmendinger (1989) develops a separate typology for VET programs, others distinguish between general education and VET by the specificity of the vocational content (Müller and Shavit 1998; Lavrijsen, Nicaise, and Poesen-Vandeputte 2014). To develop a multi-dimensional classification, Pilz (2016) complements the two dimensions of the stratification and standardization with the skill formation approach (Busemeyer and Trampusch 2012), which focuses on the interaction between political and socioeconomic institutions and other VET stakeholders, and the pedagogic approach of the practice of learning, which is the specific teaching and learning process.

In addition to these two prominent comparative dimensions—that is, the educational providers or learning places and organization structures—several studies bring in new perspectives. Two build on Luhmann’s (1995) theory of social systems: Greinert (1995, 2000) identifies the governing patterns of system-specific communication in VET, and Clement (1996) explores the different meanings communicated in VET. Although these classifications help scholars understand the diverse cultures and subjective meanings of VET, they remain too abstract for empirical testing and application. Brockmann, Clarke, and Winch (2008) compare the meanings and roles of the key terms of the European Qualifications Framework—namely qualification, knowledge, skills, competence, and learning outcomes—in different countries. They reveal that the meanings of these terms largely depend on national and cultural contexts.

Although Greinert (2004) and Green (1999) are particularly interested in the evolution of education and training systems, both do not make their research processes transparent. Focusing on the historical development of VET, Greinert (2004) classifies the guiding principles and learning cultures that underlie education and training systems and that are reflected in educational institutions. Examining how education and training systems respond to globalization, Green (1999) proposes five types based on the modes of articulation among central governments, education and training, labor markets, and firms.

A look at the research questions reveals that seven studies (Allmendinger 1989; Hannan, Raffe, and Smyth 1996; ILO 1998; Müller and Shavit 1998; OECD 2000; Biavaschi et al. 2012; Lavrijsen, Nicaise, and Poesen-Vandeputte 2014) set out to explain the labor market outcomes of education and training. However, the International Labour Organization (ILO 1998) and Biavaschi et al. (2012) make no attempt to provide the theoretical foundation required for an explanatory typology. Although the OECD (2000) states that it distinguishes between common characteristics in transitions, it differentiates between only dominant upper-secondary pathways, leaving unclear the targeted common characteristics. The remaining four studies (Allmendinger 1989; Hannan, Raffe, and Smyth 1996; Müller and Shavit 1998; Lavrijsen, Nicaise, and Poesen-Vandeputte 2014) derive their comparative dimensions from a theoretical argument and present empirical examples. In addition, they use their typologies to formulate and empirically test hypotheses on the labor market outcomes of education and training.

Allmendinger (1989) and Müller and Shavit (1998) investigate the relationship between educational attainment and labor market outcomes and the way in which this relationship varies among education and training systems. Allmendinger (1989) compares education and training by differentiating between low or high degrees of standardization and stratification, resulting in a 2x2 typology. Regarding VET, she argues that on-the-job

training is less standardized and comes with high stratification (e.g., the US), whereas training in public schools does not stratify people and is highly standardized (e.g., Norway, West Germany). In their comparative study of upper-secondary education, Müller and Shavit (1998) identify six types of education and training systems based on their levels of standardization and stratification. Although they discuss occupational specificity as a third dimension, they do not incorporate it into their typology. Building on the idea of qualificational and occupational spaces, both studies show that the association between education and labor market outcomes is strongest in highly standardized and stratified systems. However, they acknowledge that further institutional settings and other characteristics related to employers, for example, might also affect this association.

Drawing on Allmendinger (1989) and on societal analysis, Hannan, Raffe, and Smyth (1996) propose a conceptual framework for analyzing cross-national variations in school-to-work transitions, by adding a third dimension to the standardization and stratification dimensions, which is the relationship between educational institutions and employers. After presenting a typology of education and training systems based on these three dimensions, they admit that further research is needed to empirically measure the relationship dimension. Lavrijsen, Nicaise, and Poesen-Vandeputte (2014) expect the specificity and stratification dimensions of education and training systems to affect labor market outcomes in the short and long run. After an extensive discussion of these two dimensions, they propose five types of education and training systems.

Taken together, the literature shows that it is a challenge to develop a typology that rests upon a strong theoretical framework and that we can empirically test and apply in further research. Moreover, previous studies offer few approaches on which we can build for the development of a VET typology that explains different labor market outcomes. Some typologies exhibit good formal quality (e.g., Rauner and Wittig 2010; Busemeyer

and Schlicht-Schmälzle 2014), but only four of them provide explanations for different labor market outcomes (Allmendinger 1989; Hannan, Raffae, and Smyth 1996; Müller and Shavit 1998; Lavrijsen, Nicaise, and Poesen-Vandeputte 2014). These four typologies highlight four comparative dimensions: the standardization, stratification, and occupational specificity of education and training, and the relationship between educational institutions and employers. Still, these scholars argue that further dimensions might need consideration. In addition, most of them concentrate on entire education and training systems instead of capturing the specific elements of VET programs. We therefore depart from prior work by constructing a typology of VET programs with an approach that fulfills the formal quality requirements. This approach builds on a systemic perspective, which helps us understand why certain VET programs result in unfavorable youth labor market outcomes.

## **STRUCTURAL COUPLING BETWEEN THE EDUCATION AND EMPLOYMENT SYSTEMS IN VET**

Starting with the conceptual level, we first elaborate on our theoretical foundation. Niklas Luhmann's (1995, 2009, 2013) theory of social systems offers a framework for examining VET in a functional perspective. In this section, we outline this theory and explain how it enhances scholarly understandings of unfavorable youth labor market outcomes.

Luhmann (1995) argues that the functional differentiation of society leads to different social systems. By function, Luhmann (1995) describes the particular contribution a social system offers to society; thus the specific function gives each system its unique identity. The function of the education system, for example, is to prepare young people for society and to assign them to social positions through selection. According to Luhmann (1995), social systems operate through communication, which is composed of a message, information, and understanding. Communication is the origin of all social operations; thus

“society is communication” (Lee 2000:320). Furthermore, in every situation, certain types of communication are expected, and expectations are recursively reproduced through communication; communication therefore produces social structures (Lee 2000).

Luhmann (1995) posits that each social system autonomously structures its operations by using a binary code that follows the function of the system. This binary code helps the system specify its own communication and thus distinguishes the communication within the system from the one not belonging to the system. Figure 1, for example, shows that Luhmann (2009) defines that the binary code of passing or failing structures the operations of the education system, thereby serving that system’s function, which is selection. Therefore, all communication related to passing or failing is part of the education system. In addition, according to Luhmann (1995), each social system needs programming that guides the assignment of the values of the binary code, such as passing or failing. The programming of the education system, for example, is the curricula, which define the qualifications that students need to demonstrate on the exam.

	Encoding (“Kodierung”)	Programming (“Programmierung”)
<b>Reflection of unit</b>	Career (“Karriere”)	Education (“Bildung”)
<b>Structuring of operations</b>	Pass/Fail (“positiv/negativ”)	Curricula (“Lehr- und Lernpläne”)

**Figure 1.** The self-referential education system

(Renold et al. (2015) drawing on Luhmann (2009))

Luhmann (1995) stresses the importance of the relationship between the system and its environment, as social systems “constitute and maintain themselves by creating and maintaining a difference from their environment” (Luhmann 1995:17). To define its environment, a social system uses its operations. The binary code works by guiding the

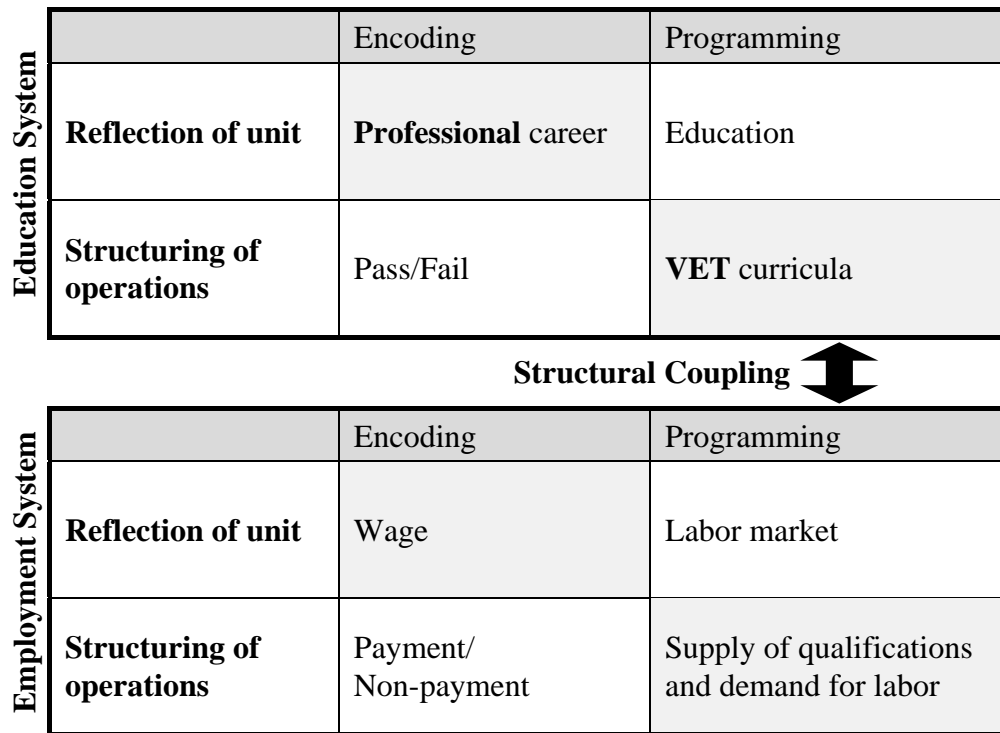
differences that steer the systems' possibilities of processing information from the environment (Luhmann 1995). In so doing, social systems are sensitive to specific information, whereas other information does not affect them whatsoever. According to Eichmann (1989), this selectivity defines the opportunities and limits for coordination between social systems and for their mutual control. Whereas coordination refers to a system's considering and reacting to the environment in its operations, control is a system's attempt to stimulate another system's coordination.

For Luhmann (2009), a social system is operatively closed insofar as it only understands its own code. In the education system, this code leads to an educational selection, which ensures that the system fulfills its function. This selection requires previous selections and at the same time enables future ones, resulting in a career within the system (Luhmann 2009). This career reflects the education system, as it assigns positions inside and outside of this system.

However, Luhmann (1995) argues that in addition to a closed part, each social system has an open part, the programming. Through the programming, a social system maintains relationships with other systems (Luhmann 1995). By deciding on what affects system-specific operations, programming allows the system to consider external information. According to Luhmann (2013), when a social system structurally relies on certain information in its environment, i.e., from another system, structural coupling occurs (Luhmann 2013). Social systems that are structurally coupled remain autonomous, whereas their programming is adjusted to the structures of the respective system. The education system, for example, considers external information in its programming through curricula. These curricula translate the information in a way that the system can use them to structure its operations.

We conceptualize VET as a part of the education system, as its programming helps with assigning positions in society through selecting for careers (see Figure 2). All communication related to the programming follows the binary code of passing or failing, whereas VET curricula set the standards for how the education system assigns the values of this code. In contrast to VET, workplace learning belongs to the employment system as long as it follows the code of payment or non-payment, which is reflected in a trainee's wages. However, we consider the unproductive hours of workplace learning as part of the education system when they teach qualifications that are tested on a practical exam, thereby applying the code of passing or failing.

In contrast to general education, the purpose of VET is to prepare for further education and for a professional career at the same time. Therefore, the connectivity of professional careers to the demand for qualifications in the labor market defines the interface between the education and employment systems in VET (Eichmann 1989). Both systems evaluate their operations based on this connectivity, leading to structural coupling between them. Importantly, when this connectivity does not meet the expectations of the two systems, it can lead to problems with coordination and control, such as the occurrence of skill mismatch. On the one side, this mismatch refers to the difficulty of having qualifications that are not connected to the expected reward in the labor market, for example, when graduates have to accept jobs that do not match their qualifications. On the other side, the employment system observes that the qualifications that the education system produces do not match the demand of the labor market.



**Figure 2.** VET in the interface between the education and employment systems (Renold et al. (2015) drawing on Luhmann (2009))

Taken together, analyzing VET from the perspective of the theory of social systems points to the importance of clarifying structural coupling between the programming of the education system (VET curriculum) and the employment system (supply of qualifications and demand for labor). This theoretical foundation enables us to identify potential problems with coordination and control, which might lead to unfavorable youth labor market outcomes. In the following section, we build on this theoretical framework and propose a methodological approach for developing a typology of the linkage between actors from the education and employment systems in VET.

**METHODOLOGICAL APPROACH FOR A VET TYPOLOGY**

*Strong Conceptual and Theoretical Framework*

We propose a typological approach that attempts to meet the previously discussed challenges with the help of a strong conceptual and theoretical framework. To understand the

interface between education and employment systems in VET and to explain unfavorable youth labor market outcomes, we apply Weber's (1968) concepts of ideal types and real types. Ideal types constitute a mental image for analyzing the empirical reality, captured with real types, and for clearly defining the applied terms and concepts (Weber 1922, 1968, Doty and Glick 1994, Gerhardt 2001). Furthermore, the heuristically derived ideal types guide the formulation of hypotheses on how VET programs affect youth labor market outcomes (Weber 1968; Doty and Glick 1994).

We apply the terms and concepts from Luhmann's (1995, 2009, 2013) theory of social systems. This theory provides the necessary vocabulary for analyzing the interface between the education and employment systems to understand unfavorable youth labor market outcomes (Eichmann 1989). As social systems consist of communication, according to Luhmann (1995), structural coupling between two systems takes place in the communication as well. However, when breaking down this communication into something measurable, we need to investigate the actors that socially interact by communicating. Through their communication, actors always refer to specific social systems. For example, they refer to the education system when they use the code for passing or failing an exam, whereas they refer to the employment system when they argue about payment or non-payment for specific qualifications.

We assign actors to either the education system or to the employment one based on the codes they use in their communication. Although actors from the employment system might be individual firms, employer associations, labor governance, or even unions, actors from the education system typically involve educational institutions, schools, or teachers (Renold et al. 2016). We can now measure structural coupling between the education and employment systems by looking at the communication between actors of the two systems.

Applying the concepts of the theory of social systems (Luhmann 1995, 2009, 2013) helps us bypass heterogeneous context conditions between or even within countries, the “nostrification” (Grollmann 2008:254) problem, and the distinct understandings of meanings (Brockmann, Clarke, and Winch 2008). Our typology, for example, does not analyze the qualifications defined in VET curricula but investigates whether actors referring to the communication codes of the education and employment systems engage in defining these qualifications, thus enabling structural coupling between the two systems. The theory of social systems also sets our analytical unit, that is, VET programs describing different ways in which VET is organized.

As Weber (1956) argues, understanding is a prerequisite for causal explanation and empirical operationalization in the social sciences. We meet that argument by considering the communication codes of the education and employment systems when constructing a typology of VET programs. However, although Weber assigns meanings to actors, for Luhmann (1995), the codes of social systems constitute specific meanings. Still, both scholars argue that all social operations refer to subjective meanings that scholars need to take into account.

As our aim is to complete our understanding of different VET programs by achieving an explanation for unfavorable youth labor market outcomes that we can also test empirically. We attempt to overcome the often criticized disadvantage of typologies of having little explanatory power (Bailey 2004). Admittedly, although the theory of social systems helps scholars understand a functionally differentiated society, such “scaffolding theories” (“Gerüsttheorien,” Haller 2013:36) are not aimed at delivering causal explanations (Krieger 1996; Haller 2013).

To make the structural coupling between the education and employment systems empirically measurable, we need to draw on additional concepts and theories. In this article,

we start with the concept of the curriculum value chain (CVC; Renold et al. 2015), which will be described in detail later, to investigate this structural coupling in VET along the curriculum process. We then build on further theoretical concepts to explore where actors from the two systems should share power to prevent problems with coordination and control, with what we call the “linkage between actors of the education and employment systems.”

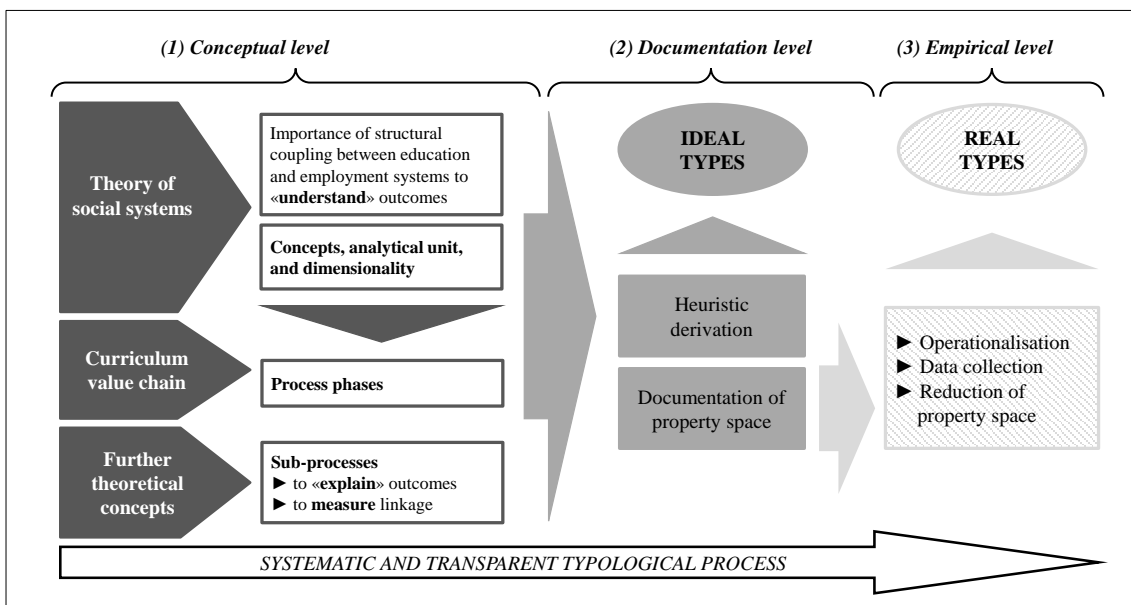
### *Systematic and Transparent Typological Procedure*

Besides having a strong theoretical and conceptual framework, our typology meets the quality criteria of being systematic and transparent. We achieve this aim by applying the previously discussed three-level model of Bailey (2004). On the conceptual level, we inductively derive the comparative dimensions that serve as the axis of our typology’s property space (Lazarsfeld 1937; Barton 1955). The theory of social systems (Luhmann 1995, 2009, 2013) provides our main dimension, specifically the linkage between actors from the education and employment systems in VET. On this level, we already have a mental image of the ideal types in mind by exaggerating our dimension to the point that it cannot be found empirically (Doty and Glick 1994; Kelle and Kluge 2010). We then break the linkage down by identifying the process phases and sub-processes in which these actors could interact along the CVC. We can thus measure the intensity of the linkage and explore the potential roots of problems with coordination and control.

On the documentation level, we first put the property space on paper with the help of the earlier-defined dimension, process phases, and sub-processes. We then elaborate on the designation of each ideal type, where the “goal of the ideal-typical concept-construction is always to make clearly explicit not the class or average character but rather the unique individual character” (Weber 1968:505).

On the empirical level, we locate the empirical representations—the real types—in the previously constructed property space. For that purpose, we first need to operationalize our comparative dimension with measurable features, for which we can collect data. To reduce a property space to an empirical typology, Lazarsfeld (1937) proposes three different procedures—functional, pragmatic, or arbitrary numerical reduction—that scholars still use. Nevertheless, today, quantitative social scientists apply various statistical methods to construct empirical types (Doty and Glick 1994; Bailey 2004). In addition, in the qualitative social sciences, numerous scholars discuss and develop methodologies for empirical typologies (e.g., Kelle and Kluge 2010).

Figure 3 summarizes our methodological approach for a typology of VET programs, which we apply in the following section to develop a typology of the linkage between actors of the education and employment systems.



**Figure 3.** Overview of methodological approach for VET typology (own depiction)

## **APPLICATION: TYPOLOGY OF THE LINKAGE BETWEEN ACTORS FROM THE EDUCATION AND EMPLOYMENT SYSTEMS**

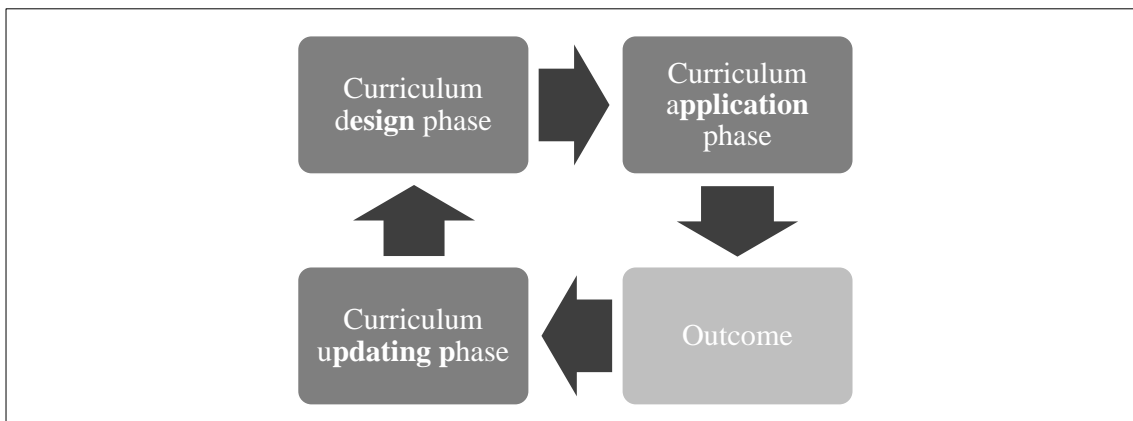
In this section, we identify the property space and ideal types of our typology on the linkage between actors from the education and employment systems in VET. With this endeavor, we also propose the theoretical framing of our previous inductive work on how to operationalize the linkage between actors from the education and employment systems (Renold et al. 2016; Renold et al. 2017). In this work, we measure the intensity of the power-sharing between actors from the education and employment systems for the provision of VET programs by the KOF Education Employment Linkage Index (KOF EELI) and apply it to 20 countries. In the future, we will use the KOF EELI data to identify the real types of our property space.

### ***Conceptual Level***

As the lead theory defines the theoretical framework of the entire typology, identifying this theory represents a crucial step in our methodological approach. We have chosen the theory of social systems (Luhmann 1995, 2009, 2013; Eichmann 1989), which tells us where to look to better understand the labor market outcomes of VET programs. According to this theory, all communication related to VET needs to refer to both the education and employment systems through its programming. As VET programs should not only prepare for professional careers but also guarantee eligibility for further education, connectivity to both educational and professional careers constitutes these programs.

What is more, the theory of social systems places our focus on VET curricula. These curricula determine the assignment of the communication code's values and thus define the standards for passing or failing an exam. Drawing on Kelly (2009), we conceptualize a curriculum as a process instead of as the content that a VET program ought to deliver. The CVC breaks the curriculum process down into three phases: the curriculum setting,

application, and updating (Renold et al. 2015; see Figure 4). In the curriculum design phase, actors define the content and qualification standards of the curriculum. In the curriculum application phase, teachers and trainers impart these standards and content to students. These two phases lead to educational outcomes, such as graduates' employment statuses or conditions. In the curriculum updating phase, actors evaluate these educational outcomes and use the evaluation results for the design of the curriculum, for example, with the help of an update or reform.



**Figure 4.** Curriculum value chain (Renold et al. 2016)

Building on the concept of the CVC, we concentrate on VET programs as our analytical unit. These VET programs describe different ways in which VET is organized by a specific composition of actor settings (Renold et al. 2016). In so doing, we also implicitly consider VET governance, whereas its in-depth analysis would lead to a separate typology (e.g., Rauner and Wittig 2010; Busemeyer and Schlicht-Schmälzle 2014).

We now identify the sub-processes, in which actors from the education and employment systems can engage in VET along the three phases of the CVC. We conceptually derive these sub-processes to elaborate where the communication between the two kinds of actors needs to take place for favorable youth labor market outcomes.

In curriculum design, actors from the education and employment systems need to engage in the definition of a VET program's qualification standards and the form and content of its exams. According to Kelly (2009), a curriculum must go "to an explanation, and indeed a justification, of the purposes of such transmission and an exploration of the effects that exposure to such knowledge and such subjects is likely to have, or is intended to have, on its recipient" (9). In VET programs, curricula can explore these effects by including the needs of the labor market. Consequently, the definition of the qualification standards, content, and forms of exams needs to incorporate the expectations of the employment system by giving the actors of that system decision competencies. Thus not only actors from the education system but also those from the employment system should engage in the definition of the skills and competencies that students need to qualify for educational or professional careers.

Müller and Shavit (1998) posit that the occupational specificity of the imparted vocational qualifications is relevant for explaining the labor market outcomes of education and training. They argue that with higher occupational specificity, the association between education and labor market outcomes is stronger. However, as we do not assess qualifications but instead focus on the linkage between actors from the education and employment systems, we can consider this specificity by distinguishing between VET programs for a specific job at a firm (high specificity), for an occupation (medium specificity), or for a professional career (low specificity). Alternatively, we could measure the specificity of a VET program by the number of curricula that the program covers. As with higher occupational specificity, each job has its own curriculum. We argue that the more curricula a VET program comprises, the more specific it is.

Three of the typologies used in an attempt to explain the labor market outcomes of education use the standardization of qualification standards as a comparative dimension

(Allmendinger 1989; Hannan, Raffe, and Smyth 1996; Müller and Shavit 1998). For our typology, the question is how much such a standardization relates to the linkage of actors between the education and employment systems in VET. We argue that this standardization is related to where the communication between actors from the education and employment systems takes place, for example, at a regional or national level, and to which proportion of the educational authorities or employers is represented. With a strong standardization of the qualification standards, that is, when VET programs meet the same standards nationwide, employers can rely on standardized and recognized certificates, leading to a smooth transition from education to employment.

Both the occupational specificity and the standardization of a VET program describe the quality of the actors' engagement in the curriculum design. The other two quality criteria in this process phase are whether the engagement of the actors is defined by law—as only then is it guaranteed—or not and whether the different actors each have only an advisory role.

Kelly (2009) further differentiates between the planned curriculum and the received curriculum: “By the official or planned curriculum is meant what is laid down in syllabuses, prospectuses and so on; the actual or received curriculum is the reality of the pupils' experience” (11). Consequently, not only does the linkage between both kinds of actors in the establishment of the qualification standards matter but also how much they engage in the students' experiences in the application of the curriculum matters.

VET programs can achieve this mutual engagement of actors from the education and employment systems when workplace training complements learning in the school environment. The numerous VET classifications focusing on learning places highlight their importance (e.g., Lauterbach 1984, 1995; OECD 1985; Eichhorst et al. 2015), although this is not the case for previous explanatory typologies (Allmendinger 1989; Hannan,

Raffe, and Smyth 1996; Müller and Shavit 1998; Lavrijsen, Nicaise, and Poesen-Vandeputte 2014). As students learn some skills more easily in the school environment, whereas others are more suited to learning in the workplace, some scholars argue that these two learning places are complementary (Aarkrog 2005; Bolli and Renold 2017). Others posit that some skills require on-the-job experience with the task itself for students to develop full competency (Rauner 2004; Wolter and Ryan 2011). Like learning in a school environment, workplace learning requires goals that determine the tasks in which students engage. To support the acquisition of prescribed practical skills instead of pure familiarization with work, workplace learning needs to be structured and regulated (Billett 2011).

Exams are a crucial part of the qualification process, determining the qualifications with which someone leaves a VET program, and must thus incorporate both learning places. According to the theory of social systems (Luhmann 1995, 2009, 2013), the education system structures its operations along the code of passing or failing to fulfill the system's selection function. This passing or failing happens on exams, which need to take place both in a school environment and in the workplace in VET programs. Only then is workplace learning in VET programs part of the education system. We can then assess the quality of the engagement of the two kinds of actors by studying who has decision power.

Another possibility for engaging actors from the employment system in the curriculum application is by providing or funding school resources, such as equipment or part-time teachers. In so doing, these actors not only take part in the workplace training of students but also engage in their learning in the school environment. The availability of such resources also influences how teachers apply the curriculum and how students experience it (Billett 2011).

In curriculum updating, actors from the two systems can engage in measuring the outcomes of a VET program, for example, by using employer surveys on the professional and educational careers of graduates. The results of these surveys need to enter the discussion on the timing and content of an updating or reform of the VET program. Only then will the VET program take into account its effects (Kelly 2009).

Table 1 summarizes the outcome of the conceptual level by differentiating between communication sub-processes, used to measure which actors are engaged, and quality sub-processes, used to measure the quality of that engagement.

**Table 1.** Sub-processes along the three process phases

<b>Process phases ►</b>	<b>Curriculum Design</b>	<b>Curriculum Application</b>	<b>Curriculum Updating</b>
<b>Communication Sub-Processes</b>	Definition of qualification standards and content of exams	Learning happens in the school environment and workplace	Gathering information on outcomes
	Definition of examination form	Exams take place in the school environment and workplace	Using the information for content and timing of update
		Provision of resources (e.g., equipment, teachers, costs)	
<b>Quality of Sub-Processes</b>	Legal definition of engagement		
	Participation or decision power		
	Occupational specificity	Regulation of workplace learning	
	Standardization of qualification standards		

We now proceed with the documentation level, in which we put our typology in writing with a presentable property space and derive our ideal types of VET programs.

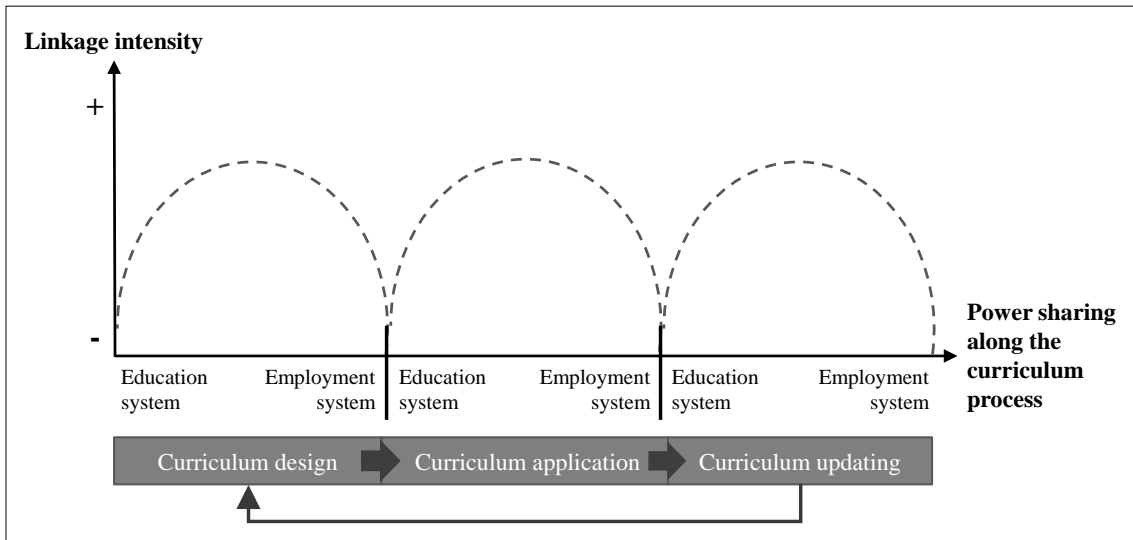
### ***Documentation Level***

As discussed in the previous section, the linkage between actors from the education and employment systems in VET can take place in different sub-processes in every phase of the CVC. The intensity of the linkage between the two kinds of actors varies depending on how much power, that is, how many decision competencies, each system has. First, the linkage intensity increases with the growing number of process phases in which actors from both systems engage. Second, even within these process phases, the linkage intensity varies with the number of sub-processes in which the two systems are coupled and with the quality of this structural coupling. Third, the intensity of the linkage depends on how much power each system has in every single sub-process and on the quality of the linkage. We can thus think of the linkage as the power-sharing between actors from the two systems, representing their attempts to stimulate the other system's coordination (Eichmann 1989).

However, our theoretical and conceptual framework does not indicate where in the CVC the structural coupling between the two systems needs to take place to prevent problems with coordination and control. Consequently, we build on functional equivalencies; thus power-sharing can happen in any of the sub-processes and process phases. Considering functional equivalencies and configurations enables us to circumvent the earlier-introduced problem of “nostrification” (Grollmann 2008:254). By arguing that the combination of different linkage intensities in different process phases—or even sub-processes—can lead to the same outcome, we also follow a configurational approach (Doty and Glick 1994).

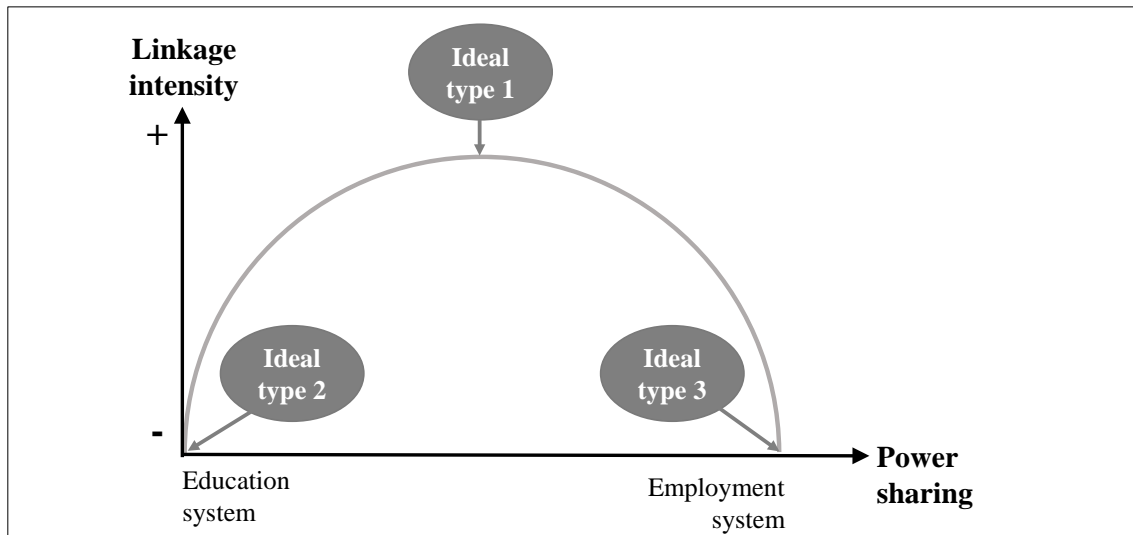
We illustrate our property space via a diagram that includes power-sharing between actors from the two systems (x-axis) and the resulting linkage intensity (y-axis) along the three process phases of the CVC. We reduce this property space to a two-dimensional

diagram by splitting the x-axis into the three process phases (see Figure 5). This diagram shows that the linkage varies not only in intensity but also with the kinds of actors that engage in each process phase. VET programs can have a weak linkage, for example, when actors from either only the education or only the employment system have all power.



**Figure 5.** Property space based on power-sharing between actors from the education and systems along the CVC and the linkage intensity (own depiction)

Drawing on this diagram, we now derive our ideal types of the linkage between actors from the education and employment systems in VET. Each ideal type highlights an extreme of our main dimension—instead of an average—and we do not find such pure cases in reality (Schmidt-Hertha and Tippelt 2011; Weber 1922, 1956 [1921/22], 1968). However, we expect the deviation of a real type from an ideal type to explain the differences in labor market outcomes. Drawing on our property space, we heuristically derive three ideal types of the linkage between the education and employment systems in VET, as Figure 6 shows.



**Figure 6.** Three ideal types of VET programs (own depiction)

Ideal type 1 entails VET programs with the maximal linkage; thus actors from the education and employment systems share power in the curriculum design, application, and updating. From the perspective of the theory of social systems, these VET programs guarantee connectivity to an educational career by providing a formal certificate that educational authorities recognize. At the same time, these VET programs fulfill the expectations of the employment system by providing graduates with the kind and quantity of qualifications that the labor market demands and therefore also preparing them for professional careers. As with the VET programs, the two systems are structurally coupled; we expect them to result in the most favorable youth labor market outcomes.

On the level of the sub-processes, actors from the two systems share power when deciding on the qualification standards. The actors' engagement in the definition of qualification standards is defined legally, the qualification standards are standardized nationwide, and VET programs prepare students for both educational and professional careers. Moreover, actors from the employment system represent a high share of employers. In VET programs, learning in the school environment is combined with regulated workplace training, and exams occur at both learning places. Actors from the two systems provide a program with the resources, for example, trainers or equipment, required for the enacting

of the curriculum. In addition, the law ensures that both actors engage in the gathering of information on the outcomes, of the program, and the collected information flows into decisions on the timing and content of the updating of the VET program.

In contrast, the second and third ideal types do not have any linkage between actors from the education and employment systems. Thus actors from only one system have all of the power. Ideal type 2 entails VET programs in which actors from the education system are the only ones engaging in the curriculum design, application, and updating, as in traditional school programs. These programs guarantee only the connectivity within the education system and therefore lack the constitutive element of VET programs, which is preparing for both professional and educational careers.

In these education-driven programs, only actors from the education system engage in each sub-process; they alone decide on the qualification standards, which do not include occupation-specific skills but exclusively impart general skills. The training and exams therefore take place only in the school environment. Moreover, actors from the education system evaluate the outcome of the program and update it without considering the expectations of the employment system. As these VET programs do not provide graduates with the qualifications that are in demand among employers, the labor market does not acknowledge the VET certificates. Graduates can only opt for further education to prevent themselves from unemployment and under- or over-qualification.

Ideal type 3 represents VET programs in which all power is with actors from the employment system; therefore, they are fully employment driven, such as labor market integration programs. In these programs, only actors from the employment system engage in each sub-process. These actors alone define the qualification standards and content of the exams—if any exist—resulting in unstandardized and very specific vocational qualifications. The training takes place only in the workplace, where employers provide all

equipment, teachers, and trainers. In addition, the program information gathering process and the updating of the program follow the requirements of the labor market. As such ideal-typical VET programs do not offer connectivity within the education system, they also lead to problems with coordination and control, and they fail in preparing graduates for educational careers. Graduates might find jobs upon labor market entry, but in the long term, they will not be eligible for further education to, for example, update or enhance their skills.

## **CONCLUSION**

In this article, we propose a methodological approach for developing an explanatory VET typology, which ensures that we meet the quality criteria of typological procedures, and which helps us circumvent the specific challenges of VET comparisons. By following the three-level model of Bailey (2004), our typological procedure is also systematic and transparent. Although our approach is geared toward a VET typology, we could apply its basic elements to any research subject.

First, our methodological approach helps us construct a typology of VET programs that is theoretically well founded. We build on the theory of social systems (Luhmann 1995, 2009, 2013), which enhances scholarly understandings of the unfavorable youth labor market outcomes of VET programs, such as unemployment or skill mismatch (Eichmann 1989). The main point is that such outcomes result from problems with coordination and control between the education and employment systems in VET. We thus define the linkage between actors from the education and employment systems as our main comparative dimension. In addition, as the constitutive element of VET programs is their connectivity to both an educational career and a professional one, our theoretical foundation helps us clearly distinguish VET programs from general education or labor market integration programs.

Second, by breaking the linkage between actors from the education and employment systems down into actual communication along the CVC, our methodological approach ensures that we can empirically apply our property space. Although this article concentrates on the conceptual and documentation levels, we have already introduced our future work to complete this typology of VET programs. Moreover, this theoretical article substantiates our previous inductive work on how to operationalize the linkage between actors from the education and employment systems (Renold et al. 2015, Renold et al. 2016).

Third, we apply our typological approach to the linkage between the actors of the education and employment systems to identify three ideal types of VET programs. The first ideal type entails a power equilibrium between actors from the two systems, which we expect to result in the most favorable youth labor market. In contrast, in the second and third ideal types, only one system has all of the power, resulting in undesirable outcomes. These programs are either traditional education programs leading to further careers in the education system or in labor market integration programs.

Our next step is the empirical level, where we are going to identify the real types of the linkage between the two actors. To explore the conditions—and their configurations—of favorable youth labor market outcomes, we follow a configurational approach by identifying our real types with qualitative comparative analysis (QCA; e.g. Ragin 2014). As QCA allows for different combinations of conditions—the real types—to be related to favorable outcomes, this analysis corresponds to the idea of functional equivalencies.

Different scholars point out the difficulties of empirically applying Weber's ideal types and real types (e.g., Gerhardt 1991). Yet, our previous work on the KOF EELI, in which we measured the linkage between actors from the education and employment systems (Renold et al. 2016, Renold et al. 2017), already proves the empirical applicability

of our typology. In the future, we are going to use the KOF EELI data for the identification of the real types and complement it with document analysis where necessary. So far, we have collected these data for the biggest VET programs in about 20 countries. Still, we can enlarge our data set with information on additional countries and on further VET programs for a comprehensive picture of the VET pathway in a country.

By comparing our real types to the three ideal types, we are going to gain new insights into how countries might be able to overcome problems with coordination and control in VET programs. Although our typology focuses on the present state of VET programs, we could examine the development of these programs by measuring the linkage between actors from the education and employment systems at different points in time. Insight into the development of VET programs can help us design upcoming reforms of these programs (e.g., Renold et al. 2017). Moreover, comparing the real types to the ideal types can guide politicians when establishing goals for future reforms.

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## APPENDIX: SUMMARY OF VET TYPOLOGIES IN PREVIOUS RESEARCH

Study	Research Question	Method	Research Subject	Comparative Dimensions	Classification or Typology (with Examples in Brackets)
<b>Lauterbach (1984)</b> (not available to authors; thus, see Frommberger and Reinisch 1999)	<i>(Unknown)</i>	Empirical classification (qualitative, 12 mostly European countries)	VET systems	One dimension: - Learning venues	Four models of learning venues: - Firm - School based - Dual (firm based and school based) - Mixed systems
<b>OECD (1985)</b>	Which are the different policies that countries adopt to provide education and training, and what is their impact?	Inductive derivation of dimension Empirical classification (quantitative, 20 countries)	ET systems on post-compulsory level	One dimension: - Educational provision (school sector, apprenticeship, out of school)	As “no country organizes all its education and training within a single setting” (OECD 1985:44), three ideal models of educational provision patterns : - Schooling (CA, JP, US) - Dual (AT, CH, DE) - Mixed (UK)
<b>Allmendinger (1989)</b>	Do the characteristics of education and training systems matter for occupational outcomes upon labor market entry?	Deductive derivation of dimensions Empirical typology with explanatory real types (quantitative, three countries)	ET systems on different educational levels	Two dimensions of organizational structure of education and training: - Standardization - Stratification	2x2 table separately for VET with two real types: - Low stratification, high standardization (DE, NO) - High stratification, low standardization (US on the job)
<b>Green (1991)</b>	How can scholars use comparative analysis for the development of policy, and what can the UK learn from existing models of VET?	Empirical classification (qualitative)	Post-compulsory VET systems	Unclear	Three models of post-compulsory VET: - Employer led (DE) - Education led, college based with general education and VET - In different institutions (FR, IT, JP) - Within same institution (SE)

Study	Research Question	Method	Research Subject	Comparative Dimensions	Classification or Typology (with Examples in Brackets)
<b>Deissinger (1995, 1998)</b>	What are the specific characteristics of VET and their potential for comparative research?	Deductive derivation of dimensions Theoretical classification	VET systems	Three dimensions of qualificational styles: - Role of qualification process in socialization - Regulatory-organizational framework of qualification process - Didactic-curricular orientation	Three ideal models of qualificational styles: - Function oriented (UK, qualification on the job) - Academically oriented (FR) - Occupation oriented (DE)
<b>Greinert (1995, 2000)</b>	How can scholars order VET based on a plausible dimension in a manageable typology?	Deductive derivation of dimension Theoretical classification	VET systems	VET as social action systems, differentiated by the structure of the systems' communication → One dimension: - Structure of system-specific communication (Luhmann 1995)	Three models of VET systems, following Max Weber's typology of power: - Legitimized through customary law - Regulated by market (GB, JP, US) - Regulated by government law or bureaucracy (mostly school based) Plus mixed models, such as cooperative systems
<b>Lauterbach (1995)</b>	Unclear	Unclear	VET programs	One dimension: - Leading learning places (vocational schools, firm or work site, vocational training centers)	Five historically grown models of VET: - Apprenticeships - Vocational schools - Firm specific - Compensatory in firm-independent, labor market-oriented institutions - Firm internal
<b>Clement (1996)</b>	Does the category of social meanings help scholars to compare VET?	Deductive derivation of dimension Theoretical classification	VET	One dimension: - Communicated meanings (drawing on Luhmann 1995)	Three models of meanings: - Educational (VET in contextual purpose of education system) - Employment (purpose of matching with qualification profiles in future jobs)

Study	Research Question	Method	Research Subject	Comparative Dimensions	Classification or Typology (with Examples in Brackets)
					- Occupational (purpose of occupational status attainment)
<b>Hannan, Raffae, and Smyth (1996)</b>	Which conceptual framework can help scholars to analyze cross-national variation in school-to-work transitions based on different sources (existing cross-national research, esp. from societal perspective)?	Deductive derivation of dimensions Empirical typology with explanatory real types (quantitative, 11 countries)	ET systems on upper-secondary level	Three dimensions: - Standardization (stand.) - Stratification (strat.) - Relationship between educational institutions and employers (strong, collinear, de-coupled with strong market signals, school placement function, de-coupled with weak market signals)	2x2x5 table with eight real types of ET systems: - High stand. (standard.), high strat., strong relationship (AT, CH, DE, DK) - High stand., high strat., collinear relationship (NL) - High stand., medium strat., de-coupled with strong market signals (GB, FR, FI, IT, IL) - High stand., low strat., de-coupled with strong market signals (IE, SE) - High stand., low strat., school placement function (JP) - Low stand., medium strat., de-coupled with strong market signals (ES) - Low stand., medium strat., de-coupled with weak market signals (CA) - Low stand., low strat., de-coupled with weak market signals (US)
<b>Münch (1997)</b>	How can scholars analyze VET from different perspectives; does no sure formula for a comprehensive comparison exist?	Empirical classification (qualitative)	VET programs	Unclear (phenomenological derivation of essential differences between VET leads to basic models of VET programs)	Three basic models of VET: - Firm where firms have full autonomy (JP, US) - Cooperation, education in schools with practical training (DE) - School (upper secondary or tertiary)
<b>Müller and Shavit (1998)</b>	Is the strength of the association between educational attainment	Deductive derivation of dimensions and ideal types	ET systems on upper-	Three dimensions: - Stratification (strat.) - Standardization (stand.)	Two ideal types of school-to-work transitions drawing on societal analysis:

Study	Research Question	Method	Research Subject	Comparative Dimensions	Classification or Typology (with Examples in Brackets)
	and labor market outcomes positively related to the institutional context of education and training systems?	Empirical typology with explanatory real types (quantitative, 13 countries)	secondary level	- Specificity (training for specific areas of activity or occupations; low, intermediate, high)	<ul style="list-style-type: none"> <li>- Qualificational spaces with high rate of specific VET</li> <li>- Organizational spaces with mostly academic or general education</li> </ul> 2x2x3 table with six real types: <ul style="list-style-type: none"> <li>- Low strat., low stand. (AU, GB, US)</li> <li>- Low strat., high stand. (IE, JP, SE)</li> <li>- Medium strat., low stand.</li> <li>- Medium strat., high stand. (FR, IT, IL, TW)</li> <li>- High strat., low stand.</li> <li>- High strat., high stand.: (DE, CH, NL)</li> </ul>
<b>ILO (1998)</b>	How successful are different VET types in preparing young people for employment, and what are their main characteristics in adjusting to the changing demand for skills?	Derivation of dimensions unclear Empirical typology with explanatory types (qualitative)	VET systems	Three dimensions of training: <ul style="list-style-type: none"> <li>- Organization in the workplace</li> <li>- Supporting incentives</li> <li>- Institutional structures</li> </ul>	Three major types of VET: <ul style="list-style-type: none"> <li>- Cooperative (DE, AT, CH)</li> <li>- Enterprise based                             <ul style="list-style-type: none"> <li>- Low labor turnover (JP)</li> <li>- Voluntarist (UK, US)</li> </ul> </li> <li>- State driven                             <ul style="list-style-type: none"> <li>- Demand led (HK, SK, SG, TW)</li> <li>- Supply led (transition economies)</li> </ul> </li> </ul>
<b>Green (1999)</b>	Does a process of the convergence of education and training systems on global and regional norms exist (as the globalization theory predicts)?	Empirical classification (qualitative)	ET systems	Unclear (but stresses modes of articulation among central government, education and training systems, labor markets, and firms)	Five primary models of education and training: <ul style="list-style-type: none"> <li>- Japanese (also SG, TW, SK)</li> <li>- German (also AT, CH, NL)</li> <li>- French (Latin rim states)</li> <li>- Swedish (Nordic states)</li> <li>- England and Wales</li> </ul>
<b>OECD (2000)</b>	What are the ways in which various dimen-	Deductive derivation of dimensions	ET systems on upper-	Common characteristics along the process and context of transition, but	Four models of education and training: <ul style="list-style-type: none"> <li>- Apprenticeship (DE, CH)</li> <li>- Mixed pathway (AT, DK, NL, NO)</li> </ul>

Study	Research Question	Method	Research Subject	Comparative Dimensions	Classification or Typology (with Examples in Brackets)
	sions of transition outcomes relate to the context and processes of transition?	Empirical typology with explanatory real types (quantitative, 10 countries)	secondary level	measured by only one dimension: - Dominant upper-secondary pathway (general education, school based vocational, apprenticeship)	- School based (AT, DK, NL, NO) - School based vocational (BE, CZ, FI, FR, HU, IT, PL, SW, UK) - General education (AU, CA, GR, IE, JP, SK, PT, ES, US)
<b>Greinert (2004)</b>	What is the historical development of VET based on common principles, organizational forms, and learning concepts that are reflected in educational institutions?	Empirical classification (qualitative)	VET systems	Description of models along six dimensions that are not explicitly mentioned or used for the classification: - Quantitative relation between training demand and supply - Type of occupational qualifications - Standardization of training practices - Financing of training - Tracking of individual training course types - Learning locations	Three models of VET (“prototypes”): - Vocational orientation - Academic orientation - Market model
<b>Brockmann, Clarke, and Winch (2008)</b>	What are the debates and policy responses on key terms of the European Qualification Framework in VET in DE, NL, and the UK?	Inductive derivation of dimension Empirical classification (qualitative, three countries)	VET systems	One dimension: - Meanings and rationales of key terms of EQF (which are qualification, knowledge, skills, competence, learning outcomes)	Two models of VET: - Knowledge-based VET in DE and NL - Skill-based VET in UK

Study	Research Question	Method	Research Subject	Comparative Dimensions	Classification or Typology (with Examples in Brackets)
<b>Biavaschi et al. (2012)</b>	What are the determinants of the labor market situation of young people (with a special emphasis on the role of VET policies)?	Derivation of dimensions unclear Empirical typology with explanatory types (qualitative)	VET systems	Four dimensions: - Economic development - Youth labor market integration - Labor market institutions - Dominant type of education and training for youth	Eight country clusters: - Continental Europe, mainly German-speaking countries - Anglo-Saxon countries - Transition countries in Central and Eastern Europe - Mediterranean countries, especially ES - Middle East and North Africa - Sub-Saharan and South Africa - Latin American countries - South and East Asia, including CN, IN
<b>Dumas, Méhaut, and Olympio (2013)</b>	Can the idea of a European model of education and training systems be validated, or do structural differences persist?	Derivation of dimensions unclear Empirical typology (quantitative, 25 European countries)	ET systems on post-compulsory level	Three dimensions: - Level of vocational provision in upper-secondary education - Success rates in upper-secondary education - Continuing vocational training	Three models in countries with strong VET pathways: - Integrative comprehensive (FI, SE, NO) - Separation type with integrative vocational system (AT, CH, CZ, SK) - Separation type but less integrative (IT, RO, SI)  Stronger heterogeneity in countries with poorly developed VET pathways
<b>Lavrijsen, Nicaise, and Poesen-Vandeputte (2014)</b>	How do structural characteristics of education and training systems affect the performance and social distribution of their outcomes?	Deductive derivation of dimensions Empirical typology with explanatory real types (quantitative) Descriptive real types	ET systems	Two dimensions: - Specificity (work based, school based, general) - Stratification (conservative, social democratic, liberal, Mediterranean)	3x4 table with five provisional types: - Dual VET - School-based VET - Comprehensive VET - General - Mediterranean

Study	Research Question	Method	Research Subject	Comparative Dimensions	Classification or Typology (with Examples in Brackets)
<b>Eichhorst et al. 2015</b>	How can scholars better understand VET in industrialized countries and what is the effectiveness of different models of VET?	Derivation of dimensions unclear Empirical classification (qualitative)	VET programs	Two dimensions of VET provision: - Relative importance of institutional learning and workplace training - Training provision within formal school frameworks or at vocational training centers	Three models of VET: - Vocational and technical schools (Southern European Countries) - Formal apprenticeships (UK, US, AU) - Dual apprenticeship systems (AT, CH, DK, DE)
<b>Pilz (2016)</b>	How can we combine existing approaches from a range of disciplines with a multi-perspective typology of VET?	Deductive derivation of dimensions Theoretical classification and categorization of six countries	VET processes in the broadest sense (including all VET activities)	Four dimensions: - Skill formation (macro level) - Stratification (macro level) - Standardization (meso level) - Practice of learning (micro level)	32 potential combinations with the four dimensions, whereof the author provides empirical examples for five types: - Individualized skill formation, low strat., low stand., high practice of learning (US) - Individualized skill formation, high strat., low stand., high practice of learning (IN) - State dominance, high strat., high stand., low practice of learning (FR, CN) - Company dominance, high strat., high stand., high practice of learning (JP) - State and company dominance, high strat., high stand., high practice of learning (DE)

*Note:* By education and training (ET) system, we refer to all education and training programs in a country, whereas the VET system is the total of all VET programs and pathways.