Guest editorial

1. Personnel economics and vocational education and training

1.1 Introduction

Even though vocational education and training (VET), and apprenticeship training in particular, has been on the policy agenda in a number of countries in recent years (e.g. European Commission 2015a, b), empirical research about VET at the workplace is still limited in many respects. While one reason for the paucity of empirical work was the lack of appropriate data, another reason was that the provision of VET at the workplace was long viewed as a second-best educational choice compared to academic education, and therefore attracted limited interest of both researchers and policy makers. Consequently, policy makers were (and in a number of countries still are) focused on increasing the share of university graduates while neglecting other viable educational pathways. However, growing youth unemployment rates, partly due to the financial crisis in 2008, fostered interest of policy makers in VET, partly due to the observation of low youth unemployment rates in Germany – a country with a traditionally important dual apprenticeship system where more than half of a cohort of school-leavers enrolls in apprenticeship training. Nonetheless, identifying the underlying factors that contribute to the potential success of VET programs for firms and for society as a whole is a difficult task. Simply comparing countries where VET is important with countries where VET is not important, provides limited insights, as, e.g., youth unemployment rates are affected by a number of different factors and not just the provision or non-provision of VET.

Crucial to a well-functioning VET system are firms that are willing to train apprentices or offer internships for VET students. Without the contribution of firms, governments would not be able to reform their education system in a way that would include the vocational path as much as the academic path. Therefore, the role of firms in a VET system, the rationale for firms to be active in providing workplace training, the challenges that firms face when confronted with youth seeking training places but not possessing the adequate skills required for a training position, the spill-over effects of competencies of workers with different educational backgrounds and other questions are important ones, both for policy makers and HR managers in firms. This special issue contributes by highlighting these questions with recent empirical findings from Germany, Switzerland and Spain. While VET has long been a neglected subject in economic research, there is a growing number of papers that started to analyze why firms are willing to offer VET, and apprenticeships in particular, at the workplace (for a review see Wolter and Ryan, 2011).

A first important strand of research relates to the questions about the effectiveness of VET programs at the workplace in providing skills to unskilled or semi-skilled employees, compared to hiring workers who already possess the relevant skills from the external labor market. However, given that both options are feasible strategies to satisfy a firm's demand for skilled workers, the second question is about whether providing VET at the workplace is more efficient compared to hiring externally (Stevens, 1994). Thus, a firm must compare the costs and benefits from providing workplace training compared to the costs of hiring skilled workers from the external labor market (Blatter *et al.*, 2016). Even in countries with traditionally important VET systems, such as Germany and Switzerland, only about 20 percent of all firms actually train apprentices. Thus, it is important to understand why some firms are willing to offer VET at the workplace, while many refrain from doing so. Classical human capital theory (Becker, 1962) predicted that firms would only invest in firm-specific skills but not invest in general skills. As skills acquired in apprenticeship training can be described as largely general human capital, we would not expect firms to

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make such an investment but rather burden the trainee with the costs of training by paying a apprentices wages below marginal productivity. Indeed, empirical evidence for Switzerland shows that firms are able to recoup their investments by the end of training, as apprentice pay is sufficiently low so that on average, the productive contribution of apprentices at the workplace offsets a firm's training costs. Moreover, research using Swiss data shows that while this is true for firms that actually train apprentices, expected net training costs for non-training firms would be substantial, which explains why some firms train and many others do not (Wolter *et al.*, 2006).

Motivated by the fact that German firms on average make a substantial net investment in apprenticeship training (e.g. Jansen *et al.*, 2015; Kriechel *et al.*, 2014), extensions of the human capital theory were, however, needed to understand why in some countries firms were willing to accept uncovered training expenditures by the end of the training period. The recent extensions of the classical interpretation of the human capital theory ease the assumption that labor markets are perfectly competitive. They rather assume that at least some firms may have substantial monopsony power because of market imperfections, e.g., due to search and mobility costs, information asymmetries, or unions (e.g. Acemoglu and Pischke, 1998; Dustmann and Schönberg, 2009). As a result, firms have the power to set an employee's wage below the marginal value product and thereby obtain post-training benefits even for general human capital. A number of recent papers find empirical evidence in support of that argument (e.g. Konings and Vanormelingen, 2015; Mohrenweiser and Zwick, 2009; Muehlemann *et al.*, 2013). Conversely, competitive labor markets would limit a firm's willingness to make a net investment in training due to the threat of poaching. Muehlemann and Wolter (2011) provided empirical evidence from Switzerland, showing that firms are reluctant to train apprentices in local labor markets with a high number of competitors within the same industry.

Despite the growing literature that identified important factors of a firm's demand for apprentices, and well as the expected return on investment, there are still many important research questions that need to be addressed to better understand the factors that drive both the effectiveness and efficiency of VET at the workplace. The articles in this Special Issue attempt to shed light on important questions, such as what types of skills should better be provided at the workplace rather than at (vocational) school, how pre-school competencies are associated with the productivity of trainees at the workplace, how the wage returns to training differ by vocational compared to an academic education, whether there are spill-over effects from different types of education at the workplace, and how we can make use of existing research on the return on investment to apprenticeship training in a country with a traditional apprenticeship system to help implement a dual VET system in a country that previously relied on school-based education.

1.2 Contributions in this special issue

The paper by Bolli and Renold investigates what types of skills in VET at the tertiary level ("professional education and training") should be taught at vocational school and what types of skills should be taught at the workplace. Such knowledge about an efficient division of work between the workplace and schools is particularly important for countries that are currently developing their VET systems, but also for reforms of training curricula in countries with already established VET systems. The authors survey skills of Swiss students in business administration. While they find that skills related to strategic management, human resource management, organizational design and project management processes should be better taught in schools, while soft skills are better acquired at the workplace, no clear picture emerged for skills like analytical thinking, joy of learning, or organizational competencies. These results are not only important for policy makers who design VET systems, but also for human resource managers who make decision about what skills should be provided at the workplace, and what skills might better be acquired externally.

Pfister, Tuor Sartore and Backes-Gellner analyze the relative importance of the type of education and the subject of education (commercial or health) on subsequent wages. Using data from the Swiss Adult Education Survey 2011 about academic and VET at the tertiary level, they find that subject choice explains almost twice as much of the variance in wages compared to the type of education. Moreover, they find evidence that there is a complementarity between the two types of education. Individuals who combine academic and vocational education may expect higher wage returns with a relatively low risk. The authors highlight thus the importance of a good permeability between academic and vocational tracks as a critical success factor for individuals and firms.

The paper by Jansen and Pfeifer looks at the association between pre-training competencies (oral expression, writing, basic mathematics, information technology and problem solving) and the subsequent productivity of German apprentices in carrying out skilled tasks at the workplace. Knowledge about these competencies is currently of particular importance in Germany, as demographic change forces firms to hire apprentices that may not necessarily have a firm's desired level of competencies. While firms can directly influence such competencies by providing more training at the workplace, the corresponding efforts are costly for the firm. This paper provides evidence how pre-training competencies are associated with the apprentices' productivity in the first year of training, a time when the influence of the firm to correct for potentially low levels of certain competencies is still limited. Their results show that pre-training competencies are related to productivity in commercial occupations, but not in industrial and commercial occupations.

The paper by Backes-Gellner, Rupietta and Tuor Sartore investigates "reverse" spill-over effects. While spill-over effects are typically analyzed from higher educated workers to lower educated workers, they argue that spillovers may also occur in the opposite direction, because workplace training provides workers with different, but nonetheless important knowledge also for academically educated workers. They find that spill-over effects on wages of employees with a tertiary education take a U-shaped form with regard to the number of employees in a firm with a vocational degree. They conclude an academic and VET system should co-exist, as firms are more productive when employing a mix of workers with different education levels.

Finally, Muehlemann and Wolter make simulations regarding the expected costs and benefits of Spanish firms during and after training, when considering different hypothetical (but realistic) scenarios to introduce a dual apprenticeship training in Spain that would resemble the Swiss model. Such knowledge is particularly relevant for policy makers before implementing a specific framework for apprenticeship training. The authors conclude that two factors are of particular importance: the training duration and the apprentices' wage. However, there is considerable heterogeneity across occupations regarding the requirements of the training curriculum, so that there should be flexibility regarding the apprentices' wage and the training duration depending on the corresponding training occupation. While school-based vocational education in Spain currently lasts two years for all training occupations, the authors find that for many occupations it is necessary to extend the duration of the apprenticeship training program to three years. Otherwise, apprentices spend too much time away from the workplace to attend vocational school, so that firms would not be able to recoup their training investments within a two-year period and therefore refrain from offering training places.

Samuel Muehlemann
Munich School of Management, University of Munich, Munich, Germany, and

Stefan C. Wolter
Department of Economics, University of Bern, Bern, Switzerland and
Swiss Coordination Centre for Research in Education, Aarau, Switzerland

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