Guest editorial

Preface

This special issue entitled "Labour market matching processes: skills, learning and measurement in the mobile age" results from the collaboration among a group of enthusiastic academics from the fields of labour economics, lifelong learning, human resource management, sociology of occupations and knowledge management, who in the early 2010s set out to explore how different disciplines measure, understand and explain mismatches in European labour markets, and what avenues for better labour market matching they propose. Exploring the insights from each of the disciplines, and synergies from an interdisciplinary dialogue, researchers from the University of Amsterdam, Corvinno Technology Transfer Center, Trinity College Dublin, University of Salamanca, Central European University and University of Siegen, as well as a number of Associated Partners, joined forces in the framework of the Eduworks project, which was funded by the EU FP7 Marie Sklodowska Curie ITN programme between 2013 and 2017.

Including more than forty experienced academics, nearly twenty early stage researchers, representatives from civil society organisations and the business sector, and other stakeholders, the project aimed at developing competence and carrying out research in the area of labour market matching processes. This project resulted in more than 100 exciting and novel publications in this unique interdisciplinary topic, contributing to the development of cutting edge methods in web data analysis, and providing novel insights in hotly debated topics such as migration and labour, the future of work or learning analytics.

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EDUWORKS was firmly grounded in five different disciplines that focus on three levels of aggregation. At the individual level, it focused on the fit between persons' abilities and job demands (HRM/Lifelong learning), at the meso-level, on labour supply and demand matching in educational institutes and occupations (sociology of occupations). On a national and European level, EDUWORKS focused on labour supply and demand mismatches (labour economics). Finally, the activities within and across the aforementioned disciplines were catalysed through insights from the field of knowledge management. The specific research aims were:

(1) Investigating demands – abilities fit, that is the extent to which individual skills and abilities match the demands (tasks) and requirements of organisations, and the ways in which organisations allocate tasks to jobs, following an evidence-based approach by leveraging scientific research into the practice of target areas and vice versa.

(2) Investigating the mechanism concerning the division of work reflected in task sets of occupations and the shaping of occupational boundaries, the skill sets related to these occupations and the ways in which organisations define their skills need.

(3) Investigating the wide range of mechanisms causing skills mismatches in national and European labour markets, including the impact of the 2008 crisis on skills–occupation mismatch in Europe, and workers' responsiveness to labour market shortages concerning gender, age and ethnicity.

After a careful peer review, the editors selected eight papers for this special issue. These contributions are clustered along the three main areas outlined above.

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The potential lack of correspondence between the education and competences of the labour force and the needs of the productive system is a major source of concern. Three papers look at the issue at the macro level, shedding light on a number of measurement issues. Bustillo *et al.* present a comprehensive review of the different strategies that can be followed to measure over-education, and discuss the implications of using alternative methodologies. Exploiting the Programme for the International Assessment of Adult Competencies 2012 and the European Labour Force Survey 1998–2013, they study the evolution and convergence of incidence of over-education across 22 countries in Europe for university graduates. They conclude that policy makers and governments should be particularly careful when estimating over-education, as results can be very different depending on the estimation methods. Much remains to be understood specially when making predictions on the future of education.

Tijdens *et al.* study skill mismatch comparing educational requirements vs attainments by occupation. Few studies have been able to measure skills mismatch, because information about the demand side of the labour market is lacking. This problem can be solved by aggregating required skill levels in job ads and attained levels of jobholders into occupations, and comparing required vs attained skill levels per occupation. Using vacancy data from the official job portal and jobholder data from the WageIndicator web survey, in this study skill mismatch is explored for the Czech Republic. The paper shows that jobholders are overeducated compared to the vacancies' requirements, and that jobs in high demand have lower educational requirements.

Pedraza *et al.* study the matching process before and after the Great Recession in the Netherlands. Using data from 2001 to 2014, the paper studies the Dutch labour market matching process accounting for the three labour market states and their heterogeneities. The paper contributes to current discussion about the specification of the matching function and the assumption of constant returns to scale (CRTS) when using unemployment as a labour supply measure. The Dutch matching function displays CRTS only when using an alternative labour supply measure that includes the short-term employed as jobseekers. The elasticity of hires with respect to the short-term employed was significant, positive and countercyclical, while elasticities relating to new entrants were procyclical. Findings are at odds with the idea of mismatch and a shortage of skills: search frictions for employers were lower after the crisis and vacancies were filled faster. In a loose labour market context with increasing short-term employment, employers increase their hiring of employed workers.

Shifting the focus, the next two papers look at the particular challenges of measuring labour market matching for specific skills in the IT sector. Using a learning domain ontology and the methods of graph clustering and linear least squares regression, Vas *et al.* study the effect of concept-level connections on learning performance. Employers expect graduates to possess self-regulatory skills in learning and consider them more important than the degree qualification. This paper is the first to identify how the application of semantic technologies and networks can contribute to the improvement of these skills and provide means for the practical implementation of the connectivism learning theory. This study tells us that education policies aiming at skill matching should reinforce the utilisation of technology and domain networks in enabling and improving self-regulatory and self-directed learning both in formal education and workplace settings.

Chala *et al.* looked at the technical aspects of matching jobseekers and available job vacancies on the basis of semantic software technology. The novel aspect of their approach is their bi-directional matching algorithm, which computes the degree of semantic similarity between jobseeker qualifications and job requirements provided by employers, through job vacancies. This matching algorithm also attempts to integrate state of the art occupational classification systems. In their evaluation they focus on jobs in the area of Internet of Things.

Finally, three studies explore the peculiarities and strategies of skill matching at the individual level. Using OECD indicators on the strictness of employment protection legislation (EPL) that govern both regular and temporary employment, Ulceluse and Kahanec investigate the effect of EPL on native and immigrant self-employment as a vehicle of skill matching. The analysis covering 18 European countries over the period 1995–2013 finds a positive effect of EPL of regular employment on native self-employment and an indication of a negative effect on immigrant self-employment. Intriguingly, the effect of EPL governing temporary employment seems to have a positive effect on immigrant self-employment, but does not seem to affect natives. These findings suggest that stricter EPL reduces employers' flexibility in adjusting to economic cycles and forces them to contract out work instead, an effect particularly strong for natives when it comes to regular employment and for immigrants in the case of temporary employment.

The contribution by Arnedillo-Sánchez *et al.* investigates if and how employers screen candidates' social media profiles to identify personal employability attributes. In so doing, it aims to shed light into the potential mismatch between the personal purpose of social media and recruiters' job-related use of this data. After delivering Employability Skills Social Media Survey (rESSuME) to 708 employers in the UK and the USA, the 415 completed surveys were statically analysed. The results show that more than 75 per cent of those surveyed use Facebook to screen most candidates. Loyalty and reliability are the personal attributes employers most searched for and they look for personal attributes examining posts, comments and photos. Country and gender differences are also reported.

Finally, the paper by Pajic *et al.* looks at how nurses in Hungary can adapt to the fast changing nursing jobs in healthcare. The authors put significant effort to translate the Career Adaptability Scale to Hungarian and adapt it to the nursing occupation. With their survey study, they focused on the types of adaptive behaviours, what Hungarian nurses show on the work floor. They show that besides traditional nursing knowledge, it makes a lot of sense to equip nurses with lifelong learning skills, enabling them to continuously update their technical knowledge about nursing, but also think proactively their roles and careers as nurses in the twenty-first century.

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