Received 30 March 2022
Revised 9 September 2022
Accepted 17 November 2022

Doctoral education in Europe: models and propositions for transversal skill training

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Abstract

Purpose – This paper aims to investigate existing practices of transversal skills training in doctoral education and provide recommendations for improvement for universities, industry and doctoral students in Europe. The results offer a detailed picture that has implications for the design of doctoral education programs that aim to support transferable skills development and graduate employability.

Design/methodology/approach – A qualitative research method was used for this study; thus, data gained from existing literature were the most significant aspect of this study, serving as the key approach to answering the research questions. A literature review approach, which involved synthesizing and analyzing existing literature, was adopted in this study. Essential themes were identified and collected from literature through an inductive coding technique to find answers to questions in this study.

Findings – The research highlights the importance of coordinated efforts to improve transversal skills training in doctoral education programs. Universities must adapt their curriculum to meet industry skill requirements and provide enabling support for faculty innovative teaching. Private enterprises must continue to provide training for doctoral graduates employed in the industry because not all skills can be taught and developed in the university. Doctoral students themselves must be intentional about creating industry networks for acquiring transferable skills needed in nonacademic jobs.

Social implications – In response to industry demands, a university should not be seen as a place where doctoral students formulate a theory about the net ideology of a discipline but as a place for socializing, interacting, arguing critically and developing transferable skills for various careers. The advocacy for transversal skill training in doctoral education positively impacts society, producing doctoral researchers with an innovative mindset. Universities must continue improving existing skill-based training and work-integrated learning practices while seeking new collaboration with various industry sectors.

Originality/value – This study provides relevant ideas for faculty, industry and doctoral students on enhancing the employability of doctoral graduates through the development of transversal skills.

Keywords Doctoral training, Transferable skills, Employability, Doctoral education, Transversal skills

Paper type Conceptual paper

Introduction

Over the years, the number of doctoral students studying and graduating annually from universities in OECD countries has increased significantly (Germain-Alamartine, 2021;

Funding: This research did not receive any specific grant from funding agencies in public, commercial or non-governmental organizations.

Studies in Graduate and Postdoctoral Education
Vol. 14 No. 2, 2023
pp. 164-170
Emerald Publishing Limited
2398-4686
DOI 10.1108/SGPE-03-2022-0028

Paolo and Mane, 2016). The increase can be attributed to the 2000 Lisbon Strategy, Bologna Process and EU 2020 Strategy, all of which advocate for development of a knowledge economy, among other goals. These European policies emphasize the need for a higher supply of scholars for the knowledge economy (Germain-Alamartine and Moghadam-Saman, 2020; De Grande *et al.*, 2011). Doctoral holders play a significant role in realizing the EU policy agenda and Lisbon goal because doctoral training contributes toward achieving a competitive knowledge economy. The Bologna Process and Horizon 2020 also emphasize the role of doctorates in translating "great ideas from the lab to the market to the lab" (Ghosh and Grassi, 2020). Nevertheless, the rise in the number of early career researchers is, however, not matched with academic opportunities in which faculty traditionally trained doctoral holders for (Germain-Alamartine, 2021). As the number of PhD students increase, academic positions for these graduates have decreased over time (Ghosh and Grassi, 2020). Generally, there is a decrease in the number of research and professorial vacancies available within higher education institutions (Rodrigues *et al.*, 2018). Therefore, doctoral graduates are seeking for jobs outside academia (Germain-Alamartine, 2021). The number of doctorates seeking jobs outside the academia is increasing over time and the shortage of career opportunities causes this increase within the university (Thune, 2009). Some scholars argue that doctoral qualifications alone do not correspond to industry requirements in terms of skill mismatches (Germain-Alamartine and Moghadam-Saman, 2020). Previous studies provide insights into job market destinations for doctoral graduates but little is known about how to prepare doctoral candidates for nonacademic jobs. The research questions guiding this study are as follows:

RQ1. What are the models of transversal skill training in doctoral education?

RQ2. How can university improve transversal skill training at doctoral education level?

RQ3. How can doctoral students enhance their transversal skills development?

RQ4. How can firms support transversal skill development in doctoral education?

This study contributes to knowledge by focusing on the role of university, industry and doctoral students in increasing doctoral graduate employability.

Transversal skill gap in doctoral candidates

Transversal skill also known as transferable skills are general professional competencies applicable in all professional environments. Transversal skills are skills set required to transform academic research into society applications (Nerad, 2015). Transferable skills can be developed through formal education and informal training such as internships, professional doctoral programmes and exchange programs (Germain-Alamartine and Moghadam-Saman, 2020). Although doctorate holders are trained to work in a wide range of careers, some scholars argue that the skills possessed by doctorate holder do not correspond with nonacademic job requirements, resulting in skills mismatch (Germain-Alamartine and Moghadam-Saman, 2020; De Grande *et al.*, 2011; Germain-Alamartine, 2021; and Tynjala, 2007). Some employers perceive doctoral researchers to be in their ivory tower, separated from other disciplines and people. Thus, making employers doubt the competency and fitness of doctoral graduates for business environment. Some doctoral candidates see nonacademic jobs as an "alternative" career and academic jobs as "main" career. Thus hindering doctoral candidates from investing in relevant competencies needed for nonacademic jobs (De Grande *et al.*, 2011). The researchers opined that the top three skills required by employers include technical skills, teamwork and analytical thinking; on the contrary, doctoral candidates rated research skills, scientific knowledge and analytical thinking as the most valuable skills for industry jobs. Industry recruiters require a

combination of technical skills and transversal skills such as ability to work with others, business management and project management (De Grande *et al.*, 2011), leadership, people management, project management, collaborative and interpersonal skills, needed to gain employment in industry positions (Rodrigues *et al.*, 2018). Although academic career is the primary destination of doctorate holders (Germain-Alamartine, 2019), private enterprises are increasingly becoming a career option for PhD graduates because of the expansion of private sector research and development capacity (Germain-Alamartine and Moghadam-Saman, 2020). Research evidence shows that type of discipline determines the extent to which transversal skill training can be integrated into academic programs. Disciplines of Science, Technology, Engineering, Mathematics and Medicine (STEMM) tend to have more enablers for transferable skill training in doctoral education. Doctoral students in STEMM seem to receive extensive technical training through engagement in lab projects, whereas the transversal skills of their non-STEM peers tend to be underdeveloped. According to Barros (2019), STEM candidates received higher training in transversal skills from universities than in Social Sciences. The study found a divergence of transversal skill training between STEM and Social Sciences, where the former group appears to have profited more by teaching transferable skills.

Methodology

A qualitative research method was used for this study; thus, data gained from existing literature were the most significant aspect of this study, serving as the key approach to answering the research questions. A literature review approach, which involved synthesizing and analyzing existing literature, was adopted in this study. It is vital to discuss the rationale for adopting this approach. A literature review method is used to identify existing information on a topic and interpretable trends in a research area (Pare *et al.*, 2017), all of which align with this study. Essential themes were identified and collected from literature through an inductive coding technique to find answers to questions in this study. As Thomas (2006) suggested, an inductive approach allows research findings to arise from important themes present in data without constraints posed by structured methodologies.

Results

Models of transversal skills training

University-wide doctoral training. Graduate academies in Germany such as the University of Jena Graduate School in Germany prepares doctoral students for careers in academics, society and business by integrating interdisciplinary topics into specific programs and custom-made courses for transversal skills development. Doctoral programs offered by the University College Cork includes a wide range of modules to help doctoral students develop transversal skills such as scientific writing, communication and presentation skills (EC, 2011b).

National inter-institutional collaboration. As part of the strategic goals, doctoral schools in Estonia provide mobility opportunities, transferable skills, summer and winter schools and social skills to support multidisciplinary research and promote collaboration between higher education institutions and private sector. The Programme for Research in Third Level Institutions in Ireland is another typical example of inter-university cooperation. Through the programme, seven universities collaborated and developed graduate academies with structured doctoral programmes. The four-year doctoral programmes provide inter-university training in discipline-specific and transferable skills through industry placements, laboratory shifts and internship opportunities (EC, 2011b).

Thematically structured doctoral training. Through the Austrian Science Fund, doctoral students in research-based universities benefit from study abroad programmes and transversal skills training. Flemish universities provide funding for interdisciplinary

doctoral programs. The Flemish schools connect their doctoral programmes with job market outcomes by providing transversal skill training to early career researchers (EC, 2011b).

International collaboration for transversal skills training. The MIT-Zaragoza International Logistics Programme provides a special learning experience for doctoral students through its partnership with industry and government. After graduation, students receive a PhD degree and certificate in Logistics and Supply Chain Management from the University of Zaragoza and Massachusetts Institute of Technology, respectively. In the EU, the Marie Curie Initial Training Networks provides doctoral candidates with mobility and networking opportunities to enhance research and transversal skills development, joint collaborative research and graduate employability (EC, 2011b).

Transversal skills training in collaboration with industry. The Baekeland programme in Belgium provides funding for doctoral projects executed in partnership with an enterprise. Doctoral students develop transferable skills by working on company projects. The First Spin-off Scheme supported by the Federation Wallonia-Brussels also promotes project collaboration with industry and inspires scholars to create new industrial products. Through the partnership between Ericsson Telecommunications Company, Eotvos Lorand University and Budapest University of Technology and Economics, MSc students, doctoral students, professors and company supervisors work on industry-related projects in Hungary (EC, 2011b).

Propositions for transversal skill training

Propositions for universities

- Universities should improve their doctoral curriculum to enhance employability of their graduates for and nonacademic jobs by inviting industry professionals in teaching and supervision of doctoral students (EC, 2011a). Although the demography of doctoral students and industry employers are uniquely different, universities should adapt its curriculum to meet diverse needs of regional employers (Germain-Alamartine, 2019).
- Where applicable, professional doctorates programme can be substituted with traditional doctorates to provide doctoral candidates with deeper insights into various skills required by industry (Germain-Alamartine and Moghadam-Saman, 2020).
- University deans and heads of departments need to strengthen relationship with industry professionals to attract funding and project opportunities for doctoral candidates who wish to conduct industry-related dissertation (Treptow, 2013).
- Universities should include local industry partners in the consortium of institutions for doctoral education to provide students with opportunities to gain knowledge of the partner industry operations and activities (Rodrigues *et al.*, 2018).
- Universities could further broaden their doctoral training programmes and adopt a more "entrepreneurial academic model" which prioritizes knowledge application and interdisciplinary education (De Grande *et al.*, 2011).
- Higher education institutions must encourage international mobility, international networking, collaborative cross-border research and work placement to equips doctoral students with multicultural competence and team spirit for working in diverse multinational environments (Nerad, 2015).
- Where applicable, doctoral students should also be encouraged to take up part-time jobs as part of opportunities to acquire transversal skills.
- Universities in collaboration with recruitment agencies can organize job application seminars and career fairs to increase doctoral graduate employability and foster link between doctoral candidates and potential employers (De Grande *et al.*, 2011).

- Complementing doctoral supervisor expertise with faculty peer networks in mentoring programs for doctoral researchers is essential for doctoral candidate's networking (Heflinger and Doykos, 2016).
- Faculties and departments can organize doctoral employer forums such as the PhD employer forums at the University College London (LERU – League of European Research Universities, 2014), where students hear from a panel of speakers who are PhD holders with industry work experience.
- Faculties in both STEM and non-STEM need to continue employing student-centered pedagogy such as project-based learning, problem-based learning, work-based projects and other innovations which enhance the development of both technical competencies and transversal skills in students (Sá and Serpa, 2018).
- It is important to mention that adopting a holistic model for transversal skill training requires a university-wide cooperation for implementation. Each faculty is expected to be charged with conceiving, mapping, planning, implementing and evaluating PhD students' transversal skill development. Therefore, the onus also lies on the faculty to consider how to incentivize academics who actively engage in integrating transferable skills in course delivery and how success will be measured in terms of learning outcomes. Nevertheless, these roles seem intricately complex due to environmental factors that faculty exercise little control over (Green *et al.*, 2009).
- The academic culture in higher education institutions rewards individual productivity, creativity, scholarly capacity, intellectual effort and independent scholarship, limiting motivation for partnering activities among academics (Sá and Serpa, 2018). Faculty promotion systems have yet to incentivize teaching evenly to research outputs convincingly. Among other criteria, faculty promotion has been largely based on the number of research publications, patents, grants awarded and student research supervision. Incentivizing lecturers through innovative teaching awards and other recognition programs that acknowledge the excellence of independent academics and academic teams for transferable skill training could be a headway, especially if such excellent teaching practices are employed by other faculties (Green *et al.*, 2009).

Propositions for doctoral candidates

- The propositions for improving transversal skills training require organized efforts at all levels. Doctoral candidates must prioritize transversal skill development and be proactive to find jobs in the increasingly complex route to employment (Heflinger and Doykos, 2016).
- With faculty support, doctoral students must actively attend conferences, seminars and other career development opportunities as part of their doctoral education (Nerad, 2015).
- Those seeking nonacademic jobs must seek collaboration with potential industry employers to identify research problems which could increase chances of employment because of deeper insights gained by doctoral students (Thune, 2009).
- As job opportunities are limited in academia, doctoral students must have full awareness of available career pathways (De Grande *et al.*, 2011).

Propositions for industry

- Not all competencies can be taught through university modules; therefore, private enterprises retain the obligation to train potential employers by providing doctoral

candidates with opportunities to gain technical and transversal skills (De Grande *et al.*, 2011).

- Industries should leverage competitive funding opportunities that require university-industry collaboration for joint projects sponsored by national governments and international organizations, e.g. the EU Skills Agenda and European Universities

Conclusion

As the number of early career researchers seeking employment outside academia continues to grow, all actors must cooperate to enhance transversal skills training for doctoral students. Universities must continue to improve international mobility, mentoring, joint research, career services, industry-based projects and university–industry partnerships to help doctoral students develop discipline-specific and transferable skills for academic and industry career. Private enterprises need to provide on-the-job learning opportunities for doctoral candidates who could be potential employees. Doctoral candidates must actively search and participate in transversal skills development opportunities.

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