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Executive Summary

Comparative Analysis of PhD Programmes Across Countries

Background and Scope

This study was conducted within the framework of the Horizon project "Methodologies for Teamworking in Eco-outwards Research" (METEOR), examining doctoral education systems across ten European countries: Denmark, Finland, Spain, Italy, Cyprus, Poland, the United Kingdom, Norway, Türkiye, and Georgia. Through analysis of 160 stakeholder interviews and extensive documentation review, this study provides an evidence-based foundation for understanding how European doctoral education can better prepare graduates for diverse career trajectories while maintaining research excellence.

The research adopts a multi-level approach examining structural conditions of doctoral programmes, teaching and curriculum approaches, supervision systems, and societal engagement mechanisms, gathering perspectives from doctoral students, university administrators, supervisors, and employers to provide a holistic understanding of current challenges and opportunities.

Main Findings

Despite variations in programme structures, regulatory frameworks, and quality assurance mechanisms across countries, doctoral education systems show remarkably similar challenges in transversal skills development within PhD education. The analysis reveals systematic gaps in the choice of formats and content for competency development as well as a need for the development of supportive institutional environments and relevant ecosystems for effective skill building.

The persistence of academic culture creates a mismatch between doctoral training and stakeholder expectations. Career preparation failures emerge universally, with students consistently reporting inadequate preparation for non-academic careers despite statistics showing that the majority of PhD graduates will not pursue academic positions. Critical gaps exist in entrepreneurship and commercialisation skills, communication for non-academic audiences, and industry integration.

Other widely reported missing skills are: research proposal evaluation and innovation project design competencies, and impact and behavioural change skills that prepare graduates for leadership roles in diverse professional contexts.

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Despite growing emphasis on universities' third mission, graduates consistently struggle to translate research capabilities into practical applications, with persistent gaps between analytical competency development and implementation preparation. Stakeholder engagement barriers prove constraining, as graduates frequently lack understanding of organisational dynamics necessary for effective policy influence and cross-sector collaboration.

Wide variations in supervision quality emerge across multiple countries, stemming from the absence of systematic training requirements, unclear expectation alignment, and insufficient institutional support frameworks. Countries lacking mandatory supervisor training experience highly variable mentorship quality dependent on individual experience rather than systematic preparation. The research reveals expectation misalignments between students seeking structured guidance and supervisors assuming minimal intervention approaches, frequently resulting in inadequate meeting frequency, delayed feedback, and student isolation.

Industry integration failures characterise most countries, which lack structured mechanisms for employer engagement in curriculum development and skills training. Students report that skill development often becomes a self-driven journey rather than systematic institutional support, creating inequities where students with greater personal resources fare better.

The research documents significant levels of financial precarity and associated mental health challenges across doctoral programmes. Many PhD students and early-stage researchers exhibit depression, anxiety, and stress levels, directly attributed to career uncertainty and inadequate financial support. Systematic talent migration affects multiple countries as graduates seek opportunities abroad due to limited domestic positions and inadequate preparation for alternative career paths.

Quality assurance variations create inconsistent student experiences, while administrative and bureaucratic obstacles consume resources that could support student development.

Recommendations

The study proposes integrated reforms addressing both individual competency development and systemic infrastructure changes.

Core competency development requires better integration of research application skills bridging theoretical mastery with practical implementation, enhanced project management and career

planning support, and targeted training in grant writing, entrepreneurship, and research ethics for diverse professional contexts. Multi-stakeholder communication capabilities must be developed alongside collaboration excellence preparation for both academic and cross-sector partnerships.

Institutional infrastructure reforms must establish supervisory training programmes preparing faculty for diverse career guidance, implement multi-supervisor models including external partners, and develop integrated wellbeing support addressing doctoral education's unique psychological challenges. Enhanced financial support frameworks should establish adequate stipend standards while creating systematic industry-academia integration through formal partnerships and structured professional experiences.

System-level policy reforms require cross-sector recognition policies ensuring appropriate consideration of PhD qualifications in diverse employment contexts, institutional reward system alignment recognising societal engagement alongside traditional academic outputs, and competency-based assessment approaches tracking graduates' real-world impact capabilities. International cooperation mechanisms must provide equitable access to transformative collaborative experiences while reducing administrative barriers to meaningful cross-border partnerships.

The evidence demonstrates that effective doctoral education systems balance academic rigor with practical relevance, individual mentorship with systematic support, and national standards with institutional innovation.

Success in addressing these challenges requires coordinated implementation across institutional, national, and international levels, recognising doctoral education's evolving role in knowledge societies while preserving research excellence and analytical rigor that characterise advanced academic training.

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Acronyms & Abbreviations

Term	Description
GDPR	General Data Protection Regulation
ADI	Associazione Dottorandi e Dottori di Ricerca in Italia (Association of PhD Candidates and PhD Holders in Italy)
AFAM	Alta Formazione Artistica e Musicale (High Artistic and Musical Education)
ANVUR	National Agency for the Evaluation of the University and Research Systems (Italy)
ASN	Abilitazione Scientifica Nazionale (National Scientific Habilitation) (Italy)
CDT	Centre for Doctoral Training (UK)
CY.Q.A.A.	Cyprus Agency of Quality Assurance and Accreditation in Higher Education
D.M.	Decreto Ministeriale (Ministerial Decree) (Italy)
DBA	Doctor of Business Administration
DTP	Doctoral Training Programme (UK)
ECR	Early Career Researcher
ECTS	European Credit Transfer and Accumulation System
EdD	Doctor of Education
ESD	Education for Sustainable Development
EU	European Union
EUA-CDE	European University Association - Council for Doctoral Education
FG	Focus Group
FINEEC	Finnish Education Evaluation Centre
HEA	Higher Education Authority
IRB	Institutional Review Board
JUFO	Julkaisufoorumi (Publication Forum) (Finland)
METEOR	Methodologies for Teamworking in Eco-outwards Research
MOC	Ministry of Education and Culture (Finland)
MUR	Ministry of University and Research (Italy)
NAWA	National Agency for Academic Exchange (Poland)
NGO	Non-Governmental Organisation
NOKUT	Norwegian Agency for Quality Assurance in Education
NTNU	Norwegian University of Science and Technology
PGR	Postgraduate Research
PhD	Doctor of Philosophy
PNRR	Piano Nazionale di Ripresa e Resilienza (National Recovery and Resilience Plan) (Italy)
PNR	Programma Nazionale di Ricerca (National Research Programme) (Italy)
PRESS	(ERASMUS+ project name - full form not provided in the document)
QAA	Quality Assurance Agency (UK)
R&D	Research and Development
RDF	Researcher Development Framework
REF	Research Excellence Framework (UK)
RTDA/RTDB	Ricercatore a Tempo Determinato di tipo A/B (Fixed-term Researcher type A/B) (Italy)

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SDGs	Sustainable Development Goals
SME	Small and Medium-sized Enterprises
STEM	Science, Technology, Engineering, and Mathematics
TTO	Technology Transfer Office
TÜBİTAK	Türkiye Bilimsel ve Teknolojik Araştırma Kurumu (Scientific and Technological Research Council of Turkey)
UK	United Kingdom
UN	United Nations
WP	Work Package
YDS	Yabancı Dil Sınavı (Foreign Language Exam) (Turkey)
YÖK	Yükseköğretim Kurulu (Council of Higher Education) (Turkey)

1 Introduction

1.1 Overview

The scope of this deliverable is to study the state of the art of doctoral education in the project partner countries. This study was conducted within the framework of the project "Methodologies for Teamworking in Eco-outwards Research" (METEOR). It is a collaborative effort involving ten countries: Denmark, Finland, Spain, Italy, Cyprus, Poland, the UK, Norway, Türkiye, and Georgia. The primary goal of the project is to help doctoral students and early career researchers (ECRs) in these countries develop crucial transversal skills, which are essential for navigating a modern research landscape. These skills are not just a simple addition to academic knowledge; they are crucial for both academic and non-academic careers. A 2020 HEA report found that for every ten PhD graduates, there's only one academic job opening. This difficult labour market makes professional development and transferable skills increasingly important. Also, less than 58% of researchers use their specialised PhD knowledge in their current jobs, emphasising the need for graduates to build a broader skill set beyond their specific research area.

The study detailed in this introduction is important because it highlights that the effectiveness of transversal skills training is not solely determined by the courses offered. It is influenced by a complex web of factors, including the structure of doctoral programmes, the curriculum, supervision practices, and collaboration with external stakeholders such as employers and the broader society.

While the project proposal included an initial analysis of transversal skills training in Europe, a more up-to-date and in-depth study was needed to inform the project's next steps. This study aims to provide a solid foundation for the next project activities by thoroughly analysing the current situation across the ten participating countries. The study explores the various aspects of transversal skills development, from the **structural conditions** of doctoral programmes to the **societal context**, examining how these different levels are intertwined.

Recognising that no single factor operates in isolation, our study adopts a multi-level approach to understand the landscape of transversal skills. We first examine the **structural conditions**, such as programme structures and policies, which set the stage for how skills are taught and acquired. We then look at the level of **teaching**, exploring the curricula and specific courses offered. Following that, we analyse the **supervision** system, as the relationship between a doctoral student and their supervisor plays a significant role in skills development. Finally, we consider the **societal level** by investigating the links between universities and the different actors in the ecosystem.

To get a comprehensive view, we collected and analysed data from a range of perspectives. We surveyed **doctoral students** and **university administrators** to understand the internal workings and experiences of programmes. We also gathered insights from **doctoral supervisors** and **employers** to bridge the gap between academic training and the demands of the professional world.

1.1.1 Research Questions

The data collected allowed us to answer several key questions, including:

- What are the main structures of doctoral programmes and how are they defined in project participant countries?
- How are transversal skills training programmes integrated into university curricula?
- Are doctoral students and ECRs satisfied with the existing training opportunities, and if not, what do they need and what actions do they recommend? What challenges and solutions do other stakeholders, such as supervisors and employers suggest?
- What are the outcomes of a lack of these skills, and who perceives this as a problem?
- Do similarities and differences exist across countries and academic disciplines?

By addressing these questions, our study provides a nuanced understanding of the current state of transversal skills training and its related challenges and opportunities. As such it can serve as a foundation for the development of transversal skills courses in this project.

1.1.2 Data Collection strategy

In order to answer the above-listed questions, data collection processes and procedures were planned. Two sources of data collection were identified: relevant documentation and semi-structured interviews with stakeholders. The relevant documentation included national and institutional regulations, decrees, orders, procedures, and other relevant sources. The additional information about existing practices were obtained through interviews with four types of stakeholders – PhD students and ECRs, supervisors, university administrators and employers. Georgia's team, responsible for this report, prepared the list of questions to be addressed by researchers for documentary analysis as well as the interview guidelines for four groups of stakeholders separately.

Each country team contributed to the study process: in 10 countries, teams collected relevant documentation and analysed these, resulting in 10 national reports. Next, the team members conducted interviews (individual and/or group) and prepared analysis of the obtained data. Then, Georgia's team integrated country reports and documents into a coherent final report and analysed the data to obtain answers to the above-listed questions. To address the extensive nature of the available data, AI tools such as Claude and Gemini were employed for cross-thematic analysis of textual elements, extraction of additional information from verifiable sources, and editing to ensure stylistic consistency.

Each country team collected around 15 interviews, either individual and/or focus groups, ensuring representation from four categories of respondents – PhD students and ECR, supervisors, administration, employers. To ensure smooth flow of the data collection process, Georgia’s team conducted special meetings/workshops with the 10 country representatives.

The interviews lasted for 45-60 minutes and were conducted either in person, or online, focus groups lasted for 60-90 minutes, 5-6 participants in each group. Interviews were conducted in the preferred language of the respondent and in a safe place indicated by the interlocutor.

Before starting the interview, the researcher provided the interlocutors with information about the project, its goals, the principles of interview anonymisation and archiving, and data protection. The interlocutor decided which questions s/he would answer. The researchers also asked interlocutors for

permission to be contacted again, including contact after the end of the project as part of a possible follow up of the project.

Focus groups were conducted in a language preferred by the participants and in a safe, comfortable environment chosen by the group. At the beginning of each session, the moderator provided detailed information about the project, its goals, the principles of anonymisation and archiving, and data protection measures. Participants retained the right to decline answering specific questions. Moderators sought permission from participants for potential follow-up contact after the end of the project.

The interviews conducted by country teams were stored by them locally. Some of the interviews were recorded to ensure full and comprehensive analysis, but were deleted immediately after the analyses were ready. As a result, all collected interviews are anonymised in such a way that the identity of the interlocutor cannot be identified.

One of the most important parts of the planning stage was establishing ethical conduct guidelines, which addressed all the related issues, such as ensuring ethical approach to study participants, researchers, and data storage. In order to reach these goals Georgia's team, with support of the CASE prepared ethics approval documentation (including the study aims description, interview guidelines, consent forms) for the corresponding university IRBs.

The ethical principles of the study are based on the universal principle of respect for human rights. In the protection and processing of personal data, we followed the principles contained in Regulation 2016/679 - Protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), and relevant documents applicable to our partners from outside the EU whose countries have not adopted Regulation 2016/679.

Ethics approvals were obtained prior to the start of data collection, which took place in March-June 2025, while the preparatory phase was done during January-March 2025.

Individual and group interview participants were given full information about the study and their role, thus, they were informed that they could withdraw their consent to the research at any time. Confidentiality of individual interview participants was guaranteed, while due to the group setting, confidentiality of FG members could not be fully guaranteed, but all participants were instructed to respect each other's privacy and not disclose shared information outside the group. Interlocutors signed the consent forms. These forms are safely stored at each partner's office.

A total of 160 participants were interviewed using multiple methods. Most interviews were conducted individually, while focus groups were also held: four in Spain, four in Norway, and two in Denmark. The interviews used a hybrid approach, with some conducted online and others face-to-face. The table below provides full information about the distribution of participants across four stakeholder groups and 10 project countries.

Table 1. Distribution of participants across four stakeholder groups and 10 project countries

Country	Students & ECR	Supervisors	Employers	University administration	Total
Cyprus	5	5	2	3	15
Denmark	4	4	1	1	10
Finland	6	3	3	4	16
Georgia	5	3	5	2	15
Italy	5	3	6	2	16
Norway	5	5	2	5	17
Poland	6	3	3	1	13
Spain	6	7	5	8	26
Türkiye	5	3	6	2	16
Uk	7	3	3	3	16
Total	**54**	**39**	**36**	**31**	**160**

The final sample of 160 participants across 10 countries varied not only by country and position (PhD student and ECR, supervisor, administrator, employer), but by age, home university and a field of specialisation as planned from the start of the data collection preparatory phase. This approach made possible further variability of the sample. In terms of a field, students, supervisors, and employers represented STEM, humanities, and social sciences, while in terms of universities, students, supervisors, and administrators represented both public and private universities, as well as professional doctorates wherever applicable. Age of supervisors and employers provided less variability than the age of PhD students and ECRs, which varied from early twenties to early fifties; in addition, they represented three stages of a student career: initial, mid and a final stage of a thesis completion. We also planned to keep a gender balance, thus, men and women were equally distributed across all categories.

Detailed information about sample characteristics by stakeholder group is provided in Appendix 3.

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1.2 Relation to other tasks and deliverables

This deliverable is related to the following other METEOR tasks and deliverables.

This deliverable receives inputs from:

Table 2. D2.2 Input from other tasks and deliverables

Deliverable	Due Date	Input for D2.2
WP2.1	28.02.2025	METEOR Research Plan

This deliverable provides outputs to:

Table 3. D2.2 Output for other tasks and deliverables

Deliverable	Due Date	Output from D2.2
D3.1	31.05.2025	Training Resource Template
D3.3	30.11.2025	Overall course catalogue ph. 1
D3.4	31.05.2026	Overall course catalogue ph. 2
D5.3	31.05.2027	Policy recommendations and METEOR manifesto

1.3 Structure of the deliverable

After the introduction, which establishes the study's context, primary aim, and methodology, the report presents the main findings. This analytical core offers comparative research across four key areas: PhD programme types/structures, transversal skills/curriculum, supervision/institutional support, and societal impact. Each area is divided into subsections outlining the state of the art, existing gaps, and best examples.

A separate section addresses major challenges, synthesising problems identified across these same four domains. The recommendations section proposes solutions organised into three reform levels: core competencies, institutional infrastructure, and system-wide policy changes. The conclusions section summarises the overall analysis and recommendations. The report includes a list of references and appendices.

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2 MAIN FINDINGS: COMPARATIVE ANALYSIS OF PHD PROGRAMMES ACROSS COUNTRIES

This section presents a systemic analysis of PhD programme structures, supervision models, and skills development approaches across 10 countries: Cyprus, Denmark, Finland, Georgia, Italy, Norway, Poland, Spain, Türkiye, and the United Kingdom, based on national documentation review provided by the project participant country experts and stakeholder interviews. The analysis reveals significant variations across these educational systems in regulatory frameworks, structural approaches, quality assurance and supervision mechanisms, training in transversal skills, relations with the job market, and addressing societal needs.

2.1 TYPES AND STRUCTURES OF PHD PROGRAMMES – COMPARATIVE REVIEW

2.1.1 Programme Structure Models

The European landscape demonstrates three distinct approaches to PhD programme organisation:

1. **Structured programmes** dominate in Poland, Spain, Türkiye and Georgia, where doctoral education includes substantial coursework components alongside research activities. Poland's Doctoral Schools, established in 2019, exemplify this approach with four-year programmes requiring semester-long courses, seminars, and lab works. Türkiye mandates a minimum of seven courses (21 credits) for students with master's degrees, while Spain's Royal Decree 99/2011 establishes structured training activities including research methods and ethics components. Georgia follows structured approaches but allows significant institutional variation in implementation.
2. **Hybrid models** characterise systems in Cyprus, Finland, Italy, Norway, and the United Kingdom, combining structured elements with research flexibility. Cyprus programmes integrate both structured and unstructured formats, with most requiring coursework in the first year before transitioning to independent research. Finland operates a unique system where traditional 4-5 year programmes coexist with new 3-year structured pilot programmes launched in 2024. Norway balances 30 ECTS credits of mandatory coursework with substantial independent research, while the UK offers both traditional PhDs and structured Doctoral Training Programmes (DTPs).
3. **Flexible approach** emerges in Denmark which maintains primarily unstructured programmes despite mandatory course requirements, emphasising independent research under supervision.

Research vs. Professional Orientation

Research-focused orientation predominates across all countries, with traditional dissertation requirements remaining central to doctoral education. However, professional elements increasingly appear through specialized programmes and industry partnerships. The UK demonstrates the most advanced professional doctorate development, offering Doctor of Education (EdD), Doctor of Business Administration (DBA), and other professionally-oriented qualifications since the late 1980s.

Industrial and professional PhD variants exist in several countries. Denmark offers Industrial PhDs through Innovation Foundation Denmark, combining company employment with university enrolment. Finland provides collaborative programmes with research centres, whilst cross-sectoral collaboration is also emphasised in the new doctoral pilot programme. Italy develops innovative PhDs addressing enterprise innovation needs. Türkiye maintains research focus but acknowledges growing professional applications in engineering, business, health, and education fields. Spain shows evolution toward professional integration through industrial doctorates and innovation challenges, though programmes remain primarily research-oriented. Norway demonstrates dual orientation encompassing both research excellence and professional development, particularly through Industrial PhD programmes and Professional Field PhDs. Poland's implementation doctorate combines academic research with industry experience, though traditional research focus persists, while Georgia follows a strict research line with no professionally-oriented programmes as defined by the corresponding legislation.

PhD programmes in Cyprus are primarily research-focused. The programmes are designed to train independent researchers and require candidates to undertake significant research projects leading to original contributions to knowledge. While some programmes may have professional applications, particularly in business, the emphasis remains on academic research and scholarly contribution.

PhD programmes in Italy exhibit characteristics of both structured (course-based) and unstructured (predominantly research-focused) approaches. The national regulatory framework mandates specific structured components while maintaining a predominantly research-oriented focus.

National regulations, including several Ministerial Decrees (e.g., D.M. 226/2021; D.M. 778/2024), mandate the inclusion of educational activities that enhance skills in research management, scientific communication, intellectual property, and ethical research conduct. These activities are meant to support the development of transversal competences alongside domain-specific research training. While programmes must include a minimum of 20 to 50 hours of structured activities per year, the main emphasis remains on conducting original research leading to a doctoral thesis.

Study modes

Full-time study represents the standard model across most countries, typically lasting 3-4 years. However, part-time options accommodate working professionals and diverse life circumstances. Both full-time and part-time PhD programmes are available in Spain. Cyprus offers both modes, with a maximum duration of 6–8 years. Finland provides both approaches, with only 30-40% of students working full-time as researchers. Italy emphasises full-time commitment but allows flexibility for specific circumstances, such as concurrent medical specialisation or company employment arrangements.

The UK demonstrates particular accommodation for part-time study, especially in professional doctorates designed for working professionals. Poland's system primarily operates full-time through Doctoral Schools, but maintains external doctorate options for working professionals. Türkiye allows both arrangements while specifying that doctoral programmes cannot be offered as evening programmes, indicating primary full-time orientation. Likewise, Georgia allows both arrangements, however, reality shows that most of the students are employed elsewhere, thus, represent part-time students. As a consequence, 3 years are not enough to finish all the programmes requirements; the majority of part-time students need 5 years to accomplish their studies.

Norwegian PhD programmes are predominantly full-time with structured flexibility options that accommodate different career paths and professional development needs. The PhD programme in Denmark requires three years of full-time independent research under supervision, completion of a dissertation, attendance of PhD courses totalling approximately six months' duration (30 ECTS points), and active engagement with other research environments, preferably internationally.

2.1.2 Regulatory Frameworks

The general provisions of PhD programmes (PhD programme curriculum, financing of students, admission requirements, graduation requirements) are regulated either at the national or institutional levels, or both:

National-level regulation provides overarching frameworks in most countries, establishing fundamental requirements for duration, credit allocation, and quality standards. Türkiye's Council of Higher Education (YÖK) exemplifies centralised control, standardising requirements across all institutions. Spain's Ministry of Universities and Royal Decree 99/2011 create comprehensive national frameworks, while Georgia's Ministry of Education and Science establishes detailed regulations including the 2024 Framework for Doctoral Education. Certain differences still exist across the universities of these countries, but these are relatively small.

Institutional autonomy operates within national parameters, allowing universities flexibility in programme design and implementation. Italy demonstrates significant university autonomy in curriculum development, funding allocation, and admission procedures while maintaining national accreditation requirements. The UK provides considerable institutional freedom within Quality Code frameworks, enabling diverse approaches across universities and disciplines.

Dual regulatory systems characterise most countries, balancing national standards with institutional innovation. Cyprus operates through national CY.Q.A.A. guidelines with institutional implementation variations. Denmark combines national PhD regulation with university-specific approaches through doctoral schools. Finland utilises the Ministry of Education and Culture steering alongside university autonomy, while Norway's institutional regulations and practices are based on national framework and guidelines.

In addition, programmes vary according to the following criteria:

- **Field of study** creates the most significant structural differences across countries. STEM disciplines typically feature more structured laboratory-based components and clearer funding mechanisms. Natural sciences in Denmark exhibit structured laboratory environments compared to more flexible humanities approaches. Italy reports biomedical sciences as highly unstructured with heavy research group dependence, contrasting with structured humanities offerings.

- **Institutional type** influences programme design and resource availability. Public universities generally maintain traditional research-oriented structures, while private institutions may offer more flexible approaches. Cyprus shows differences between state and private institutions, with private universities providing more varied doctoral programmes and financial aid options. Georgia demonstrates distinct experiences between public and private universities, with private institutions offering greater flexibility and enhanced services.

- **Programme type specialisation** creates distinct pathways within national systems. The UK's DTPs provide predetermined research focus with 1+3 year structures, while CDTs emphasise industry collaboration and multidisciplinary approaches. Professional doctorates across multiple countries integrate practical application with academic development, requiring different structural arrangements and evaluation criteria.

- **Geographic and resource factors** significantly impact programme quality and opportunities. Italy acknowledges varying infrastructure and support across regions. Türkiye and Georgia identify substantial differences between well-resourced universities in major cities and institutions in economically disadvantaged regions.

2.1.3 Quality Assurance Mechanisms

Universities across 10 project participant countries employ multiple quality assurance mechanisms at national or institutional levels.

National regulatory frameworks

National regulatory frameworks operate through specialised national agencies implementing comprehensive assessment frameworks across countries. Cyprus Agency of Quality Assurance and Accreditation in Higher Education (CY.Q.A.A.) must accredit all doctoral programmes prior to their launch. It provides national guidelines ensuring supervisors meet qualifications, though no mandatory training programme exists consistently across institutions. The agency enforces compliance with European Credit Transfer System requirements (180-240 ECTS) and minimum duration standards (3 years minimum, 8 years maximum) while conducting periodic program evaluations.

Italy employs the National Agency for the Evaluation of the University and Research Systems (ANVUR) for program accreditation, which provides conforming opinions required for all doctoral programmes and conducts periodic evaluations to verify compliance with Standards for Quality Assurance in the European Higher Education Area. ANVUR assessment creates external evaluation layers ensuring quality while posing structural challenges in meeting required standards and timelines, particularly for programmes aligned with the National Recovery and Resilience Plan (PNRR) requiring simultaneous accreditation and funding applications.

Georgia implements dual quality assurance through the National Center for Educational Quality Enhancement, which manages mandatory institutional authorisation granting operational rights for six years and required accreditation for all study programmes granted for seven years. Current developments include creating new standards specifically for doctoral programmes, as existing standards were considered insufficient for doctoral education quality enhancement, representing systematic efforts to strengthen oversight mechanisms.

The national agencies establish comprehensive standards while allowing institutional flexibility within defined parameters. Denmark operates under national PhD regulation covering curriculum, financing, admission, and graduation requirements, with regular NOKUT (Norwegian Agency for Quality Assurance in Education) evaluations leading to quality improvement initiatives and standardised reporting systems. In Finland, the Ministry of Education and Culture steers higher education through funding indicators, with 8% of university funding based on PhD production and 14% on JUFO-ranked publications, creating performance-based accountability while maintaining institutional autonomy.

Moreover, FINEEC responsibilities include carrying out audits of higher education institutions and offers recommendations for improvement, though the centre does not offer programme accreditation.
All Norwegian institutions have their own regulations, based on national framework and guidelines, but with their own additions due to the local context, with NOKUT conducting regular evaluations and quality assurance reviews ensuring consistency while allowing institutional innovation. The UK operates under Quality Code for Higher Education set by the Quality Assurance Agency, establishing expectations that all higher education providers must meet, with doctoral descriptors informed by QAA Doctoral Degree Characteristics Statement and Frameworks for Higher Education Qualifications.

Spain's Royal Decree 99/2011 establishes legal frameworks for PhD studies promoting structured programmes emphasising research training, quality assurance, and professional development, while Türkiye's Council of Higher Education (YÖK) provides primary regulatory oversight through standardised Graduate Education Regulations governed by Higher Education Law article 44. Poland operates under the 2018 Law on Higher Education and Science establishing fundamental requirements while allowing universities flexibility in implementation within national framework parameters.

Institutional quality management systems

Institutional quality management systems vary significantly in comprehensiveness and effectiveness across countries, creating substantial variations in student experiences even within the same national frameworks. Some institutions demonstrate robust monitoring through supervision agreements, systematic progress tracking, and comprehensive feedback mechanisms, while others rely on informal approaches dependent on individual initiative rather than systematic institutional support.

Denmark requires universities to provide mandatory PhD supervisor courses addressing regulatory, practical, educational, and learning aspects of supervision, with course objectives including supervision strategy enhancement, expectation alignment, constructive feedback provision, and collaborative team coordination. In Finland, the implementation of the institutional quality management system varies by university. For instance, University of Jyväskylä, requires signed supervision agreements updated annually and mandatory higher education pedagogy courses for university staff, though implementation varies significantly across institutions.

In addition, quality assurance principles call for their sustainability, thus, continuous improvement mechanisms focus on systematic evaluation and adaptation based on stakeholder feedback and outcome assessment. Countries demonstrating most effective quality assurance typically implement regular programme reviews incorporating multiple stakeholder perspectives, systematic tracking of graduate outcomes across diverse career pathways, and evidence-based programme modifications responding to evaluation findings.

However, significant implementation gaps persist across systems, particularly in supervision quality monitoring, systematic skills development assessment, and comprehensive outcome tracking. Many countries acknowledge needs for enhanced evaluation mechanisms that balance regulatory compliance with programme innovation while ensuring consistent quality standards across institutional and disciplinary variations.

2.2 TRANSVERSAL SKILLS AND CURRICULUM – COMPARATIVE REVIEW

Universities across all examined countries are grappling with how to best equip PhD candidates with transversal skills that serve multiple purposes: professional development across diverse career paths, personal growth and self-realisation, effective civic engagement, and meaningful contribution to society. The challenge lies in balancing traditional academic excellence with the growing recognition that doctoral education should develop graduates who possess diverse competencies for navigating complex professional, personal, and societal contexts. Analysis of approaches across ten countries reveals significant variation in how doctoral programmes conceptualise, integrate, and deliver skills development.

2.2.1 Navigating the Landscape of Doctoral Skills Development

Foundational Skills: Core Courses

All ten countries universally prioritise the development of critical thinking, analytical reasoning, and independent research capabilities. Courses on research methodology, ethics, and academic writing are foundational pillars. Doctoral Schools in Poland, formally embed academic and soft skills into the curriculum, including courses like "Didactics of Higher Education," which prepares future academics for teaching roles. The Turkish Council of Higher Education (YÖK) mandates a core course on "Research Methods and Scientific Ethics" across numerous programmes, establishing a nationwide baseline for responsible conduct in research. PhD programmes in Cyprus, particularly in the sciences, require coursework in the initial years, focusing on core disciplinary knowledge and research methods, with additional workshops on academic writing often available through university career offices.

Whilst these core skills are a universal focus, the depth of their integration and the resources provided can vary, presenting a structural hurdle. For instance, although most countries mandate ethics training, the extent to which it moves beyond a single course to become an embedded part of the research culture varies considerably.

Communication Skills Development

Communication skills are increasingly recognised as a vital component of a PhD education. Universities are formally addressing this need through various provisions. In Finland, the emphasis on scientific communication is strong, with formal training in scientific writing and poster presentations. The University of Helsinki's comprehensive programming extends this to a wider array of communication training, including sessions on research funding and dissemination. Italian programmes integrate communication and dissemination into their training frameworks. Course catalogues from some universities show offerings in public speaking and communicating research through different media. A best practice here is the "My three-minute PhD thesis" initiative, which encourages students to distill complex research for a general audience. Graduate schools in Denmark, such as the one at the University of Copenhagen, offer workshops on oral presentations, as well as broader topics like conflict management and networking, recognising that communication extends beyond academic forums.

Professional Skills Integration

The systematic integration of professional skills is a key area of difference between countries, with some embedding them as core competencies and others treating them as supplementary. Spain's Royal Decree 99/2011 provides a structural provision that mandates training in competencies like time management and digital literacy, often delivered through doctoral school activities. This national framework ensures a baseline of professional training for all PhD students. This mix of discipline-specific and general skills courses includes training in project management and innovation, ensuring students are equipped for professional work at an international level. While academic skills are central, national initiatives like the workshops provided in Poland by the National Agency for Academic Exchange (NAWA) offer supplementary opportunities in areas like international mobility and research funding, addressing professional skills in a more fragmented, extra-curricular manner.

Entrepreneurship and Innovation Training

Despite growing recognition of the importance of business development and commercialisation, entrepreneurship skills remain a limited and often underdeveloped area of doctoral training. The UK's advanced integration of these skills through "Impact Hubs" and "Innovation Camps" stands out as a best practice. This provision creates dedicated spaces and programmes for doctoral researchers to explore the commercial potential of their work, directly linking research to real-world applications. National funding agencies like TÜBİTAK offer grant writing and project management training, which is a structural provision that indirectly supports innovation by equipping researchers with the skills to secure funding for innovative projects. However, direct training in business development is less common. Georgia's 2024 Framework for Doctoral Education emphasises internationalisation and the strengthening of institutional capabilities, but a clear, structured path for entrepreneurship training is still in its early stages. The focus on developing joint programmes is a structural provision that could, over time, foster a culture of innovation through international collaboration.

Extra-Curricular and International Dimensions

Beyond formal curricula, extra-curricular activities and international collaboration play a vital role in skill development, though their effectiveness is often hampered by structural barriers. **University-based programmes:** Institutions in most countries, including the University of Helsinki in Finland and the Cyprus University of Technology, offer a variety of workshops and career development resources.

National Initiatives are also important. Poland's NAWA and Türkiye's TÜBİTAK are key examples of national initiatives that provide valuable training, but the opportunities can be fragmented and difficult for students to systematically access, presenting a significant structural hurdle.

International Collaboration is aspired**.** Most countries encourage international exposure through mobility programmes. This is a key provision for enhancing intercultural competence and collaboration. However, funding limitations and administrative complexities often constrain access, creating a structural hurdle that limits the reach of these valuable experiences.

2.2.2 Critical Gaps in Transversal Skills Development

Transversal skills gaps in doctoral education are diverse and multi-layered. While certain fundamental skills deficiencies appear universally across all countries and stakeholder groups, others emerge more prominently from specific perspectives or contexts. Students experience particular frustrations with career preparation and self-directed learning expectations, while institutional stakeholders struggle with implementation challenges and resource constraints. These gaps vary significantly across countries depending on their educational systems, economic contexts, and development levels.

Universal Gaps in Skills Development

Certain skill deficiencies emerge consistently across all countries and stakeholder groups, representing fundamental challenges in doctoral education.

In most countries (though not in all) studied, inadequate preparation for entrepreneurship and commercialisation of research findings emerges as a critical gap. Only UK demonstrates systematic programming through Impact Hubs, while remaining countries show minimal structured support. This gap is particularly critical given economic imperatives for innovation and knowledge commercialisation. The disconnect between academic training and commercial application limits graduates' ability to translate research into market-ready solutions and broader societal impact.

Limited training in communication for non-academic audiences represents a universal challenge that fundamentally constrains graduates' ability to engage with diverse stakeholders and achieve societal impact. While academic communication skills are well-developed, the ability to translate complex research for policymakers, practitioners, and the general public remains underdeveloped across all systems. This communication barrier significantly limits graduates' potential for policy influence and public engagement. The latter concepts are relatively familiar for social science students, while students and ECRs from STEM sciences and humanities encounter these to a much lesser degree, including global citizenship and sustainable development goals.

Systematic collaboration failures characterise most countries, which lack structured mechanisms for industry engagement in skills development. Only UK Centers for Doctoral Training show systematic integration. Limited employer involvement in curriculum design creates persistent misalignment between training and workplace requirements, undermining graduates' readiness for non-academic careers.

Additional Gaps as Seen by Students and ECR

Students and ECR identify specific frustrations with their doctoral experience that often differ from institutional perspectives on skills development. Namely, Students and ECR across all countries report that their skill development journey is characterised by self-direction and personal initiative rather than systematic institutional support. Quotes from some doctoral students capture this sentiment.

> *I've learned to manage time and stress better, and to live with uncertainty.*
>
> Doctoral student, Finland

> *I wish there were more courses aligned with our actual research work.*
>
> Doctoral student, Finland

> *Developing transversal skills... has been a bit of a self-driven journey.*
>
> Doctoral student, UK

This self-directed nature creates inequities, where students with greater personal resources or prior professional experience fare better than those entering directly from undergraduate studies.

Students and ECR also express particular frustration with the disconnect between doctoral training and career preparation. A UK student complained, "Most of the trainings are too theoretical," highlighting gaps between academic skills and practical application. Students in Cyprus, Finland, Georgia, and Türkiye particularly noted the lack of entrepreneurship and commercialisation skills, pointing to missed opportunities in translating research into practical solutions. Polish students feared that revealing their PhD status might make them appear "overqualified" for industry positions, creating a paradox where advanced education becomes a barrier.

Another big concern is insufficient career guidance for non-academic paths. A Georgian student emphasised the need for "better training and better cross-disciplinary cooperation," suggesting that current support structures fail to adequately prepare them for diverse career paths. Despite statistics showing that the majority of PhD graduates will not secure permanent academic positions, most programmes remain oriented toward academic career preparation. UK PhD students expressed a strong need for better institutional support for non-academic career pathways. While some mentoring and resources exist, they are often underdeveloped or not well integrated into doctoral programs.

> *Universities could offer more structured pathways into diverse professions, including industry placements, mentorship, and cross-sector networking.*
>
> Doctoral student, UK

The Italian context presents a particularly concerning challenge, with the ADI (Associazione Dottorandi e Dottori di Ricerca in Italia) report revealing that half of PhD students exhibit clinically significant levels of depression, anxiety, and stress, attributed to career uncertainty and precarious working conditions. Based on the interviews, the PhDs are often working in uncertainties related to funding situations, future prospects. Students develop resilience and adaptability organically through necessity, but systematic support for well-being and stress management remains inadequate.

Country and Context-Specific Gaps

National contexts and development levels also create distinct patterns of skills gaps, with countries facing different challenges based on their skills development ecosystems and resources.

Group 1 Countries - (Denmark, Finland, Norway, UK) have well-developed systems yet still face some persistent specialised gaps. Despite strong foundations, entrepreneurship integration remains an area for development across these countries, even where its importance is widely recognised. Impact and behavioural change skills exist within programmes but would benefit from more systematic embedding, while industry collaboration, though present, could be enhanced to better translate into practical skill development for students.

Group 2 Countries - (Cyprus, Italy, Spain) face implementation challenges that could be addressed to improve programme effectiveness and student experiences. A key area for development across these countries is the introduction of systematic supervisor training, which would help ensure more consistent quality. While situated in the European context, international integration could be strengthened, and although entrepreneurship programmes exist, expanding their reach to more students would be beneficial. Institutional implementation varies, creating opportunities to share best practices and create more consistent experiences.

Group 3 Countries - (Georgia, Poland, Türkiye) are working to address foundational gaps that would benefit from systematic development and investment. These countries would benefit from implementing systematic supervisor training programmes, while strengthening international integration could help connect students with global research communities. Developing industry collaboration would enhance career preparation, and expanding collaborative pedagogical approaches could help develop essential teamwork competencies. Addressing these areas would support graduates' competitiveness in international job markets and help retain talent domestically.

The severity and nature of gaps correlate strongly with national framework coordination, resource availability, and cultural attitudes toward doctoral education's role in society. Countries with stronger national coordination demonstrate superior integration, while those relying primarily on institutional autonomy show greater variation.

Apart from cross-country differences, there are also significant within-country variations in access and opportunities. In some countries, students in smaller institutions and rural locations face systematic disadvantages in accessing skill development opportunities. Extra-curricular programming typically assumes full-time, on-campus presence, systematically excluding part-time and distance learning students. Geographic and resource disparities create unequal development opportunities that compound existing inequalities in doctoral education, meaning that student experiences can vary dramatically even within the same national system.

Note: Appendix 2 presents more detailed country-specific gap profiles, methods for addressing these gaps, and the corresponding impact assessments.

2.2.3 Best Practices and the way forward

Despite persistent challenges, successful models and innovative practices across the ten countries offer valuable insights for enhancing transversal skills development in doctoral education.

Formal Curriculum Integration

Several countries have implemented comprehensive formal curriculum integration approaches that demonstrate effective pathways for systematic skills development. Spain's Royal Decree 99/2011 provides a structural provision that mandates training in competencies like time management and digital literacy, often delivered through doctoral school activities, creating a national framework that ensures a baseline of professional training for all PhD students. Similarly, the mandatory 30 ECTS coursework component in Norwegian PhD programmes represents a significant structural provision, combining discipline-specific and general skills courses including training in project management and innovation, ensuring students are equipped for professional work at an international level.

Building on these national frameworks, institutions have developed systematic skills embedding approaches that integrate academic and professional competencies throughout the doctoral journey. Some examples from Poland and Turkey are given in another section of this report (Foundation Skills: Core Courses). These initiatives reflect a broader trend toward adopting structured skills frameworks aligned with international standards like the UK's Vitae model or broader European frameworks to ensure coherence and comparability in skills development, creating systematic approaches to competency development rather than ad hoc skill acquisition.

Extra-Curricular and Non-Formal Opportunities

Beyond formal curricula, institutions across the participating countries have developed extensive extra-curricular programming that addresses gaps in traditional doctoral training. Institutions in most countries offer a variety of workshops and career development resources that complement formal academic training. Finland's University of Helsinki provides comprehensive programming including career development, research funding, and communication training, while Cyprus offers academic writing workshops through career offices, and some Georgian universities have established special training bodies that provide a variety of skills development opportunities.

These institutional efforts are supported by significant national initiatives that provide additional training opportunities in some countries, like Poland (NAWA) and Türkiye (TÜBİTAK).

While these opportunities can be fragmented and difficult for students to systematically access, they represent important supplementary support for skills development beyond formal curricula. Most countries also encourage international exposure through different mobility programmes as a key provision for enhancing intercultural competence and collaboration. International research experiences prove transformative in offering students exposure to different research cultures, structured mentoring approaches, and diverse stakeholder engagement models.

Addressing Student-Specific Needs

Successful programmes increasingly recognise the importance of student-centered approaches that address diverse career aspirations and individual learning needs, such as peer-led initiatives and seminars.

> *The curriculum now includes space for students to tailor their studies to their career goals.*
>
> University administrator, Finland

Other innovative programmes offer flexible pathways that allow students to tailor their training to individual career goals. Finland and Norway exemplify this approach, offering greater adaptability in an evolving research and employment landscape.

These approaches recognise that doctoral students have diverse career aspirations requiring different skill emphases and support structures. Addressing student frustrations with career preparation requires more proactive, systematic approaches to career guidance that begin early in doctoral programmes and extend beyond traditional academic career paths. This includes creating structured platforms to connect doctoral candidates with diverse professional opportunities and ensuring students can articulate their transferable skills effectively.

Cross-Cutting Approaches

The most successful models combine systematic institutional support with flexible, student-centered approaches to create comprehensive development ecosystems. Effective supervision and mentoring innovations that support transversal skills development are examined in detail in Section 2.3 (Supervision & Institutional Support), while industry partnerships and societal engagement strategies are explored comprehensively in Section 2.4 (Societal Impact). These integrated approaches demonstrate that sustainable enhancement of transversal skills development requires coordinated efforts across multiple institutional levels and stakeholder groups.

2.3 SUPERVISION AND INSTITUTIONAL SUPPORT: A COMPARATIVE OVERVIEW

The foundation of a successful doctoral programme rests on effective supervision and robust institutional support. Analysis of desk research and findings from interviews reveal a wide spectrum of practices across various countries, including Spain, the UK, Cyprus, Poland, Italy, Finland, Denmark, Türkiye, Georgia, and Norway. A key theme is the tension between traditional, often informal, supervision models and the modern demand for structured, accountable, and career-oriented support.

2.3.1 Supervision models and their evolution

Across Europe, there is a clear trend away from the traditional single-supervisor, "master-student" model toward more structured, collaborative approaches. The UK and Norway have largely embraced a dual or co-supervision model, which provides students with a broader range of expertise and a built-in support system. This model is crucial in mitigating risks associated with a poor student-supervisor match or a supervisor's absence. Finland takes this a step further, with doctoral researchers commonly having two to three supervisors. Additionally, in some Finnish universities each doctoral student has an external steering group (2-4 non-supervisory members). This group supports and monitors progress, aids in career planning, and ensures that teaching and other duties are appropriate for timely completion. The Finnish model reflects a deliberate institutional effort to recognise doctoral candidates as "doctoral researchers," a professional status that fosters a more collaborative and peer-like supervisory dynamic aimed at nurturing independent scholars.

This structured approach contrasts sharply with the "master-student" relationship that still prevails in countries like Poland and Türkiye. In these systems, the quality of supervision is highly variable and often depends on the individual supervisor's initiative and personal engagement. While co-supervision is an option, it is not the default, which can lead to greater potential for inconsistent support and a lack of formalised structure. Similarly, in Italy, supervision is largely autonomous, with no nationwide requirement for supervisors to undergo training, resulting in widely divergent student experiences. Spain offers a unique hybrid model, with students assigned both a "tutor" for academic integration and a "director" for research guidance, providing a two-tiered system of support. The documents also mention that some Italian programmes are moving towards "innovative" PhDs that involve collaborations with companies and a structured teaching component with close supervision.

In Georgia, the situation mirrors the challenges in Poland and Türkiye due to a lack of formal structure. Students report that supervision is often unstructured and depends heavily on the personal relationship with their supervisor. While some students have had positive experiences, others feel that the institution does not provide sufficient support for their research, such as negotiating access to external labs. This inconsistency is further highlighted by the disparity between universities: in some universities, administration has a more structured approach with detailed financial calculations and supervisor remuneration, whereas at others, supervision is unpaid, and the financial investment in PhD programmes is minimal.

The study also found that the systems with more nationwide regulations vs. systems with more institutional autonomy influences supervision: The balance between national-level regulation (e.g., setting minimum standards) and institutional autonomy (e.g., designing specific programme details) significantly impacts supervision models. More centralised systems may lead to greater uniformity but less flexibility, while more autonomous systems allow for diverse and innovative approaches. For example, in Türkiye, the programmes are governed by the Centralised National Regulation (YÖK). Strong national regulation by YÖK provides a standardised framework for PhD programmes, indirectly influencing supervision by setting core requirements.

Countries also differ in terms of provision of supervisory services. Individual supervision predominates in Georgia, Poland, and Türkiye, following traditional academic apprenticeship approaches. Students typically work with one primary supervisor who bears ultimate responsibility for academic guidance and progress monitoring. Türkiye and Georgia require supervisors to be faculty members with specific qualifications.

Committee-based supervision characterises systems in Cyprus, Finland, Norway, and the United Kingdom, providing multiple perspectives and distributed expertise. Cyprus employs Doctoral Advisory Committees with a minimum three members, while Finland utilises 2-3 supervisors with external steering groups for monitoring and career guidance. The UK typically assigns at least two supervisors to ensure continuity and diverse expertise access.

Hybrid approaches combine individual and committee elements to optimise support quality. Italy assigns both tutors for academic integration and directors for research guidance, allowing co-supervision in interdisciplinary programmes. Spain employs dual structures with tutors and directors, though implementation varies across institutions. Denmark organises collective supervision formats bringing together senior staff and PhD students for shared feedback sessions.

The above-described differences are/might be linked with the financial resources that are and can be allocated to supervision, countries with less resources cannot/might not be able to support more flexible approaches.

The status of doctoral students also impacts supervision dynamics. Countries with a status of "doctoral researchers" like Finland: emphasise the professional status of PhD candidates as "doctoral researchers," shaping a more collaborative and peer-like supervisory dynamic aimed at fostering independent scholars. Furthermore, in countries like Denmark, work-life balance is taken into account: Some supervisor training explicitly addresses supporting PhD students' well-being and role-modelling appropriate work-life balance, reflecting a holistic approach to mentorship.

2.3.2 Common gaps in PhD Supervision

Doctoral students and ECR across the countries face a strikingly similar set of challenges, regardless of their institutional or national context. These challenges often stem from systemic issues but manifest as personal difficulties in their academic journey.

One of the most persistent problems identified is the wide variation in the quality of supervision. In Poland, Finland, and Norway, students report experiences that range from highly supportive to passive and disengaged mentorship. This inconsistency is often a direct result of a lack of mandatory supervisor training. In countries like Türkiye, Italy, and Georgia, where there is no nationwide requirement for supervisors to be formally trained, the quality of guidance is highly dependent on an individual's experience and personal approach.

> *My advisor has incredible knowledge in statistics… he has significantly nurtured my academic growth.*
>
> Social Sciences doctoral student, Türkiye

> *I haven't received any mentoring support from the institution … I applied for BAP but could only do part of it due to limited funding.*
>
> STEM doctoral student, Türkiye

This inconsistency frequently leads to a fundamental disconnect between student expectations and supervisor assumptions. Students often seek structured guidance, regular feedback, and clear milestones, while some supervisors assume that the doctoral phase is a test of self-direction, requiring minimal intervention. This can result in a lack of regular meetings, delayed feedback on written work, and feelings of isolation. In Cyprus, supervisors cite difficulty in aligning schedules, particularly with part-time students. This is exacerbated by supervisors being overextended with other academic duties, a challenge also mentioned by supervisors in Georgia and Norway. In Denmark, students have reported a lack of clarity regarding the roles and responsibilities of co-supervisors, leading to confusion and frustration.

Administrative and Structural Hurdles

Navigating the administrative landscape of a doctoral programme can be a significant hurdle. The documents highlight the time constraints on supervisors, who are often burdened with multiple roles, which can detract from their ability to provide high-quality mentorship. In Italy, the overemphasis on coursework in some programmes leaves insufficient time for dedicated research, affecting the depth of collaboration. The long completion times in Finland (6-8 years, as opposed to the nominal four) also

create challenges for consistent and continuous supervision. In Norway, students report mental health pressures stemming from heavy workloads and publication demands.

> *Supervisors should support, not dominate or manipulate their supervisees.*
>
> Doctoral Student, UK

> *There are professors who push their students too far, and there's no HR office for PhD students to turn to... having some kind of external support could really help.*
>
> Doctoral Student, Italy

Another widespread problem is the absence of effective conflict resolution mechanisms. In Poland, institutional tools for managing problematic supervisory dynamics are often perceived as weak or overly burdensome, making students reluctant to use them. The documents note that issues like conflicts, supervisory neglect, or toxic relationships often go unnoticed or unresolved because there is no system for qualitatively assessing the student-supervisor relationship. This lack of a safe and effective recourse can create a toxic environment, leading to increased stress and anxiety.

The Role of Institutional Support

Institutional support for doctoral candidates is a critical, yet often underdeveloped, component of the PhD experience. In Italy, administrators acknowledge a significant gap in structured mentoring and career guidance. In Finland, while valuable resources like peer-led groups exist, their availability is inconsistent across departments. This lack of comprehensive institutional support can leave students feeling isolated and unprepared for a diverse range of post-PhD careers.

The documents also highlight the importance of institutional regulations and accountability. In Türkiye, the national regulatory body, YÖK, provides a standardised framework, but this is sometimes criticised for limiting autonomy. In contrast, institutions in Denmark and the UK have implemented online systems, like PGR Manager in the UK, and formal agreements to track progress and ensure accountability. These tools, while sometimes seen as bureaucratic, provide a clear framework that can prevent a breakdown in the student-supervisor relationship. In Georgia, a key issue is the disconnect between research institutes and universities, which limits students' practical research exposure. Given limited financial support for research, this proves to be a crucial aspect. The documents suggest that a "western model" of PhD education with financial support and cooperation between universities and research teams is necessary to address this. Students stress that supervisors should act as intermediaries in fostering cooperation between universities and research institutions, also in applying for grants and funding for research.

Best Practices and Suggestions for Improving Student-Supervisor Relationships

Effective PhD supervisors excel at balancing student autonomy with strategic guidance, providing support on both intellectual and institutional challenges as seen in the example of Italy.

International research experiences are seen as transformative, offering students exposure to more structured mentoring, regular feedback, and different research cultures.

Additionally, **peer-led initiatives and interdisciplinary seminars** are creating spaces for collaborative learning and community building. These student-driven activities help them develop a stronger sense

of academic identity and acquire skills not covered in formal coursework. In the UK, there is a **move towards cohort-based supervision**, particularly in Centres for Doctoral Training (CDTs), which organises students into groups for peer learning, mutual support, and group supervision activities alongside individual supervision. This helps reduce isolation and foster transferable skills.

Some institutions are also integrating **practical experience** into research training, such as opportunities for teaching and professional skill development, to prepare students for a wider range of careers. However, this practice is not yet consistent across all programmes.

There is an emerging focus on creating **structured mentoring programmes** that go beyond the one-on-one supervisor-student model. Some universities are experimenting with **supervisor training initiatives** to improve mentoring skills, recognising that being a great researcher doesn't automatically make someone a great mentor. These efforts are aimed at building a more supportive and comprehensive system for doctoral students.

The use of co-supervision is a best practice, with co-supervisors often more accessible and collaborative, offering students diverse perspectives and professional connections provided the roles are clearly defined. International research stays are also highly valued for exposing students to more structured and supportive mentoring cultures, highlighting areas for improvement in the domestic system.

To effectively address the systemic and individual challenges in doctoral education, the document and interview analysis proposes a range of solutions that strengthen both institutional frameworks and individual relationships. These suggestions are based on successful models and feedback from students, supervisors, and administrators.

Enhanced Institutional Frameworks and Support Systems

A cornerstone of improving the doctoral experience is the formalisation of key processes. The documents repeatedly call for mandatory supervisor training, a practice that is successfully implemented in Denmark and recommended by stakeholders in Norway. These courses, which typically last a few days, focus on enhancing supervision strategies, providing constructive feedback, and facilitating student integration into the research community. Such training could standardise the quality of supervision and ensure that all supervisors are equipped with the necessary pedagogical and communication skills.

Institutions should also implement formal agreements and tracking. Formal supervision agreements, like those used in Finland, clarify responsibilities and set clear expectations for both the student and the supervisor. These agreements, which are often reviewed annually, can be supplemented by online tracking systems, such as the UK's PGR Manager, to monitor progress and formally record discussions. This reduces ambiguity and helps to prevent misunderstandings and conflicts.

In Georgia, administrators and employers suggest that the implementation of a structured model with ongoing research as the foundation of doctoral education is necessary. This would involve providing financial support, linking doctoral topics to funded grant projects, and fostering cooperation with experienced research teams. Additionally, they propose a greater involvement of research institutes and employers, possibly through formal memorandums and structured internship programmes, to bridge the gap between academic theory and professional practice.

Countries increasingly strive for formalisation of the supervisory relationship: Many countries are introducing formal agreements, progress reviews, and defined roles/responsibilities for both supervisors and doctoral candidates. This aims to create transparency, accountability, and a more professionalised doctoral journey.

Integrated Career Guidance and Support

The documents highlight the need for a more proactive approach to career guidance. Students and employers in Finland, Denmark, and Norway advocate for integrating career planning into doctoral programmes from the outset. This includes creating structured platforms to connect doctoral candidates with industry, promoting internships, and ensuring that students are prepared for both academic and non-academic careers. In Georgia, employers note that graduates often lack skills for the job market and that there is a need to develop transferable skills like creativity and the ability to adapt to new technologies like AI.

To address issues of mental health and conflict, institutions should offer more systematic support. Denmark is a positive example, with its emphasis on providing resources for stress management and mental health. The documents also recommend implementing clear and accessible conflict resolution mechanisms, such as ombuds offices or mediation services, as suggested in Norway. These systems would provide a safe and confidential space for students to address supervisory issues without fear of reprisal.

> *Supervisors can help the student to take a more long-term view and reduce that awful panicky feeling when things go wrong.*
>
> Doctoral Student, UK

Collaborative Culture

In addition to formal frameworks, creating a collaborative and supportive culture is essential. Peer-led mentoring programmes, as seen in Poland and praised in Norway, are highly effective, low-cost ways to provide emotional and practical support. These networks allow students to share experiences, offer advice, and build a sense of community. The documents suggest that institutions should actively encourage and support these student-led initiatives.

Finally, the documents advocate for the wider adoption of co-supervision models, particularly in countries like Italy and Türkiye, where a single-supervisor model is still common. By promoting team supervision and peer support, universities can ensure that students receive well-rounded support, a diversity of perspectives, and a more structured and timelier path to degree completion. This shift in culture and practice is crucial for producing high-quality doctoral graduates who are well-prepared for the challenges of their future careers.

2.4 SOCIETAL IMPACT OF PHD STUDIES - COMPARATIVE OVERVIEW

As universities increasingly embrace their third mission alongside teaching and research, PhD education should be equipped accordingly to contribute meaningfully to this societal engagement. The societal mission, apart from addressing existing acute problems, encompasses two complementary dimensions: spreading knowledge among society and creating knowledge with the participation of society. The first involves traditional knowledge transfer and dissemination, while the second

represents collaborative knowledge creation that engages societal partners as active participants in the research process.

Analysis of practices across target countries reveals significant variation in how doctoral programmes prepare graduates for societal engagement and impact. A fundamental divide exists between traditional academic training focused on disciplinary expertise and the evolving arrangements for graduates capable of addressing complex societal challenges through collaborative, interdisciplinary, and application-oriented approaches. This evolution reflects a broader shift from viewing societal impact as knowledge dissemination toward understanding it as collaborative knowledge creation that requires fundamentally different competencies and institutional approaches.

2.4.1 Societal Impact Landscape

Embedded Collaboration Models

One of the most effective approaches to developing societal impact capabilities involves embedded collaboration models that integrate academic research with practical application from the outset of doctoral training. Rather than treating societal engagement as a post-graduation consideration, these models fundamentally redesign the doctoral experience around dual competency development.

Denmark exemplifies this integration through Industrial PhD schemes and Triple Helix partnerships, achieving the highest rate of private sector employment (37%) among doctoral graduates across the surveyed countries. The critical success factor extends beyond simple industry placement to systematic development of boundary-spanning capabilities—graduates who maintain research rigor while understanding organisational constraints and market dynamics. These programmes produce what stakeholders describe as "cultural translators" capable of navigating between academic and practical contexts effectively.

Norway's Public Sector PhD Project demonstrates similar principles in government contexts, where research questions emerge directly from policy challenges rather than purely academic interests. The embedded nature ensures graduates develop both analytical capabilities and institutional understanding necessary for effective policy influence. This model recognises that policy impact requires different competencies than traditional academic work, fundamentally altering the doctoral experience to prioritise practical relevance alongside theoretical advancement.

Finland takes a comprehensive national approach through its doctoral pilot program (2024-2027) that integrates cross-sector collaboration directly into doctoral studies through structured partnerships with businesses, research institutes, and other organizations, alongside mentoring activities designed to enhance employment across diverse sectors.

The effectiveness of embedded models stems from their recognition that societal impact requires systematic preparation rather than natural transferability of academic skills. These programmes make societal relevance a core design principle, fundamentally altering both the research process and the competencies graduates develop throughout their doctoral journey.

Individual Initiative Models

The second approach that is identifiable in many countries relies on individual graduate initiative to bridge academic training and societal application, creating highly variable outcomes dependent on personal networks, entrepreneurial capability, and cultural context. The model implies that doctoral education maintains traditional academic focus while allowing graduates to engage in different structured initiatives and independently develop pathways to societal contribution.

For example, in Poland PhD students can participate in so called “Universities of the Third Age” initiatives that offer learning and social opportunities for older adults, typically those in their third age (Universities provide this service along with cultural centers and social organisations across country). Doctoral students frequently teach at these institutions because they provide an opportunity to gain teaching experience while contributing to broader social goals.

The strength of the individual initiative model lies in its contextual adaptability. This approach recognizes that societal impact pathways vary significantly across disciplines, sectors, and regional contexts, making standardized embedded models potentially less suitable. However, outcomes can vary significantly depending on individual capability, local networks, and available support structures, creating both opportunities for innovation and challenges for consistent impact measurement.

Regulatory Recognition Models

Many countries particularly emphasize formal policy recognition of doctoral education's societal importance through comprehensive regulatory frameworks and strategic planning. However, some of them struggle with systematic implementation that translates this recognition into meaningful outcomes.

Countries such as Turkey, Spain, and Italy have developed sophisticated regulatory frameworks that acknowledge doctoral education's critical role in national competitiveness and innovation. These frameworks establish industrial doctorates, mandate technology transfer requirements, and define strategic research priorities. Nevertheless, stakeholder interviews reveal that implementation remains constrained by cultural barriers, inadequate resources, and institutional resistance to fundamental transformation.

Similarly, Georgia's centralized national regulation provides general framework for societal mission of universities. However, university representatives report that they struggle with broader societal engagement and innovation development.

This disconnection between regulatory intention and practical outcomes demonstrates the inherent complexity of translating comprehensive policy frameworks into effective educational practice that delivers measurable societal benefits.

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2.4.2 Current Gaps in PhD Preparation

Research-to-Practice Translation Deficits

A persistent issue across all examined countries is the insufficient link between research capability development and practical application preparation. Despite strong analytical foundations, graduates often experience difficulties in practical implementation of their ideas to achieve meaningful societal impact.

Academic training approaches excel at developing deep disciplinary knowledge but consistently fail to prepare for the collaborative, implementation-focused work that characterises effective societal engagement.

> *They [graduates] are knowledgeable, but often lack the ability to translate that into practical context.*
>
> Employer, Finland

Similarly, some graduates from Norway say they "struggle due to limited exposure to application environments during training".

> *Graduates lack direct contact with clients and the ability to bring results to completion in a concrete way.*
>
> Employer, Italy

Implementation preparation gaps prove particularly acute in countries with limited systematic pathways for practical application, where analytical preparation remains disconnected from implementation environments.

Stakeholder Engagement and Communication Barriers

> *I have an impression we belong to two absolutely different worlds and we cannot talk to each other. They find us boring. Besides, I think we need to better learn how to use social media and other technologies to convey the message to audiences in a simple and attractive way.*
>
> Doctoral student, Georgia

As mentioned earlier in the report, PhD graduates face systematic challenges in engaging effectively with diverse stakeholders, fundamentally limiting their ability to influence policy, drive organisational change, and create social impact. These barriers reflect both individual preparation gaps and structural disconnections between academic and societal contexts. Communication barriers persist across countries, with graduates struggling to engage effectively with society.

Lack of foreign language proficiency is also a significant barrier that hampers societal impact. According to the stakeholders, it constrains students' involvement in international work on wider societal problems.

Cross-sector understanding deficits emerge where graduates often lack understanding of organisational dynamics necessary for effective influence, creating situations where analytical capabilities fail to translate into meaningful stakeholder impact due to inadequate preparation for collaborative relationship development and institutional navigation. Involvement of stakeholders into various research projects, designing these projects in a way that supports bringing innovations and better environments to communities in a sustainable mode needs to be developed across all participant countries.

> *Lack of foreign language proficiency severely limits our students. A PhD graduate must be able to communicate internationally.*

Supervisor, Türkiye

> *It's a massive and often unspoken obstacle for those seeking policy and public engagement opportunities.*

International doctoral student, UK

2.4.3 Best practices to improve societal impact

Ecosystem Development

The most effective approaches to developing societal impact capabilities demonstrate systematic integration patterns that align institutional structures, cultural contexts, and collaborative mechanisms, offering valuable insights for addressing mismatch of expectations and coordination gaps between different actors in the ecosystem (academia, governmental sector, industry, civil society organisations).

Denmark's ecosystem integration approach demonstrates coordinated policy, funding, and cultural alignment through Industrial PhD schemes that succeed through systematic integration of university evaluation criteria, industry research needs, and government innovation priorities. This creates reinforcing mechanisms where individual success contributes to institutional goals, creating sustainable models for continued development rather than isolated successes.

Finland's example shows how systematic integration can gradually develop over time through pilot programmes that test collaborative approaches before scaling successful models. The doctoral pilot programmes serve as institutional learning mechanisms, allowing systematic refinement of integration approaches based on evidence rather than assumption, demonstrating how countries can systematically develop societal impact capabilities.

Norway's collaboration models in both public sector and policy contexts demonstrate how ongoing relationships between researchers and implementers enable evidence-based decision making while ensuring research relevance, moving beyond episodic consultation toward integrated collaboration approaches. These sustained partnerships create institutional memory and learning that benefits both academic quality and practical application.

Collaborative Research and Co-Creation Approaches

Effective responses to the disconnect between academic training and societal application increasingly involve collaborative research approaches that integrate community needs, academic rigor, and practical application from research design through implementation, thus changing traditional researcher-subject relationships toward partnership-based inquiry.

Danish collaborative research projects demonstrate how co-creation approaches produce "lasting research ecosystems" that continue generating impact beyond individual project completion. The sustainability stems from shared ownership of research questions and outcomes, creating ongoing relationships rather than episodic interventions that characterise traditional academic research approaches.

Polish `example of university work with elderly population illustrates effective boundary spanning in community contexts. This requires cultural sensitivity and collaborative capability that extends beyond traditional academic preparation, demonstrating how systematic attention to community engagement can create sustainable impact.

Interdisciplinarity and cross-sectoral partnership

Successful responses to stakeholder engagement and recognition barriers increasingly feature the importance of specific professional development opportunities that prepare graduates for boundary spanning, cultural translation, and sustained collaborative relationships throughout their doctoral experience rather than treating these as supplementary additions.

Italian experience with mandatory industry placements demonstrates how structured exposure can enhance translation capabilities when placements of two to three months provide sufficient duration for meaningful learning about implementation processes and stakeholder dynamics. These placements work best when combined with systematic reflection and competency development rather than simple exposure, ensuring graduates develop specific capabilities in bridging research-practice gaps.

International research experiences also help students grasp contextual differences. Representatives of research institutes in Georgia describe these experiences as transformative in offering students exposure to different research cultures and diverse stakeholder engagement models that can be adapted to their home contexts.

3 MAJOR CHALLENGES IDENTIFIED

The analysis of doctoral education across ten European countries reveals persistent and interconnected challenges that systematically undermine the effectiveness of PhD programmes in preparing graduates for diverse career paths and meaningful societal contribution. Despite widespread recognition of these issues, fundamental gaps persist in curriculum design, institutional support, and structural frameworks. The challenges identified transcend individual institutional contexts, suggesting the need for systematic rather than fragmented reform approaches.

3.1 SKILLS DEVELOPMENT AND CURRICULUM CHALLENGES

3.1.1 The Persistence of Academic Culture and Career Preparation Gaps

Despite widespread recognition that most PhD graduates will not pursue academic careers, the culture and structure of doctoral programmes remain predominantly academic-focused. This creates what Danish researchers describe as a "cultural mismatch between doctoral training and labour market expectations."

Fundamental career preparation failures emerge across every country examined. The Danish assessment is straightforward: "Generally, there is no strong focus in PhD education on developing competencies for non-academic careers." This observation echoes through Finland, where "non-academic employers don't always recognise the value of PhDs, who are considered overqualified for many jobs, especially in small and medium-sized enterprises." Polish students fear that revealing their PhD status might make them appear "overqualified" for industry positions, creating a paradox where advanced education becomes a barrier to employment.

The Polish perspective adds a bitter economic dimension: "Earning a doctorate appears to be unprofitable in terms of earnings." This financial reality is confirmed by a Turkish doctoral student working in government: "I work in the Ministry of Education. I haven't heard of anyone getting promoted or rewarded just because they completed a PhD." The Georgian analysis is equally stark: "There are not enough corresponding jobs in Georgia, thus, the value of a PhD in our country's job market is low."

What makes this challenge particularly poignant is that students are acutely aware they face poor prospects. The Italian ADI report documents that "a progressive decline in the intention to remain within academia over the course of the PhD" occurs as students realise their career options are limited. UK students express this uncertainty viscerally: "Once the thesis is done... then we realise: am I ready for the outside world?"

3.1.2 Critical Gaps in Transversal Skills Development

Entrepreneurship and Commercialisation represent a universal deficit across all countries studied. Only Denmark demonstrates systematic programming through Impact Hubs, while remaining countries show minimal structured support. Students in Cyprus, Georgia, and Türkiye particularly noted the lack of entrepreneurship and commercialisation skills, pointing to missed opportunities in translating research into practical solutions. Some Polish graduates view entrepreneurship and commercialisation as "entirely different skills" from their university training, requiring systematic preparation they currently lack.

Communication for Non-Academic Audiences emerges as a fundamental constraint across all systems. While academic communication skills are well-developed, the ability to translate complex research for policymakers, practitioners, and the general public remains underdeveloped. This communication barrier significantly limits graduates' potential for policy influence and public

engagement, especially in the spheres of climate change, multiculturalism and diversity inclusion, global citizenship and sustainability.

Industry Integration and Practical Application failures characterise most countries, which lack structured mechanisms for industry engagement in skills development. Only UK Centers for Doctoral Training and Finnish models show systematic integration. Limited employer involvement in curriculum design creates persistent misalignment between training and workplace requirements, undermining graduates' readiness for non-academic careers.

3.1.3 The Informal Curriculum Problem

A striking finding is the extent to which crucial skills are developed through informal or extra-curricular activities rather than formal curriculum. Students report learning project management through organising conferences, developing communication skills through science outreach, and building networks through personal initiative. A Finnish student reported that "learning happens through participation rather than formal courses."

Although it brings essential benefits, this informal curriculum creates systematic inequities. Students with greater social capital, financial resources, or prior professional experience can better navigate these informal learning opportunities. As a UK student noted: "Leaving this to individuals creates space for misinterpretation or underinformed decisions."

Self-Directed Skill Development characterises student experiences across all countries, where skill development becomes a "self-driven journey" rather than systematic institutional support. This self-directed nature creates inequities where students with greater personal resources fare better than those entering directly from undergraduate studies.

Training-Career Aspiration Disconnect generates negative emotions, which lead to frustration and is harmful to well-being. The problems highlighting gaps between academic skills and practical application are stated by students.

They consistently express frustration with the disconnect between doctoral training and career preparation, noting inadequate support for translating academic skills into professional competencies.

3.2 SUPERVISION AND INSTITUTIONAL SUPPORT CHALLENGES

3.2.1 Supervision Quality Inconsistencies

Wide variation in supervision quality emerges as a critical failure point across multiple countries, stemming from the lack of systematic training, unclear expectations, and insufficient institutional support. Italy reports that "approximately 10%, rising to 20% in the humanities, report infrequent or absent contact with senior researchers." Georgia identifies "qualifications of the programme staff and supervisors is a challenge," while noting "quality regulation problems exist in selection, defense standards, and supervisor accountability."

The absence of mandatory supervisor training in countries like Italy, Türkiye, and Georgia means that supervision quality becomes a matter of chance, relying on individual experience rather than systematic preparation. This contrasts sharply with countries like Denmark and Norway, where mandatory training ensures more consistent mentorship quality.

Expectation misalignment frequently characterises student-supervisor relationships. Students often seek structured guidance, regular feedback, and clear milestones, while some supervisors assume that the doctoral phase requires minimal intervention and tests self-direction. This disconnect leads to lack of regular meetings, delayed feedback on written work, and feelings of isolation.

The UK documents reveal "a potential tension between supervisors who are required to make sure that their students meet the formal requirements of a doctoral programme and students wishing to develop transferable skills." This tension reflects a deeper problem: supervisors trained in traditional academic models struggle to prepare students for non-academic futures they themselves may not understand.

3.2.2 Administrative Burdens and Structural Barriers

Time constraints on supervisors represent a universal challenge, with overextended administrative and academic duties detracting from supervision quality. In Georgia, supervisors struggle to keep up with constantly changing programme structures and lack of institutional support. Some Italian programmes demonstrate overemphasis on coursework, leaving insufficient time for dedicated research and affecting collaboration depth.

Absence of effective conflict resolution mechanisms creates environments where problematic supervisory dynamics go unresolved. Students across countries report reluctance to use institutional tools for managing conflicts due to perceived weakness or fear of reprisal. Some participants from Poland acknowledge that institutional tools for managing problematic supervisory dynamics are perceived as weak or overly burdensome.

Institutional support gaps leave students feeling isolated and unprepared for diverse post-PhD careers. In Italy, administrators acknowledge significant gaps in structured mentoring and career guidance. Finland, while offering valuable resources like peer-led groups, shows inconsistent availability across departments, creating systematic inequalities in student experiences.

Systematic gender disparities persist in supervisory roles across all examined countries. Men are consistently overrepresented in PhD supervisor positions, including Georgia, Spain, Türkiye, Norway, the UK, Cyprus, and Finland. This gender imbalance persists despite women comprising a majority or near-majority of doctoral students in many fields.

The disparity becomes particularly evident in higher academic ranks. In Türkiye in 2018, men comprised 68.8% of full professors, while in the UK in 2022/23, women comprised only 30.7% of full professors. Cyprus has been noted for having the worst "Glass Ceiling Index" in academic leadership among European countries. These disparities create systematic limitations in mentorship diversity and career modelling for doctoral students.

3.3 SOCIETAL IMPACT AND ENGAGEMENT CHALLENGES

3.3.1 Research-to-Practice Translation Barriers

Persistent gaps between research capability and practical application systematically limit graduates' ability to achieve meaningful societal impact. Doctoral programs demonstrate strength in fostering specialized disciplinary mastery yet consistently overlook the interdisciplinary collaboration and practical implementation skills required for effective community engagement.

Innovation Implementation barriers prove particularly challenging because they require competencies extending beyond traditional academic preparation. For example, Georgian graduates face significant gaps in "initiative and problem identification skills" necessary for grasping wider soietal areas for change, as well as implementing effective solutions. Spanish students emphasise that training is "too theoretical" and lacks "practical experience" and "hands-on training" in innovation implementation processes.

3.3.2 Stakeholder engagement, cross-sector cooperation and international networks

Outward Engagement difficulties emerge where graduates lack understanding of organisational and institutional dynamics necessary for effective influence. Challenges in engaging effectively with diverse stakeholders and contexts fundamentally limit graduates' ability to influence policy, drive organisational change, and create social impact in communities.

Inward recognition obstacles manifest where employers themselves acknowledge that businesses "do not understand or value research profiles" in innovation and problem-solving contexts. Even in innovation-friendly environments, the PhD "does not command automatic authority or prestige" in society. Students in some countries report that the PhD title "has absolutely no meaning" in many industries requiring societal engagement.

International Communication and cross-border engagement barriers further compound these local challenges, as foreign language skills deficit emerges as a substantial impediment to students' participation in global opportunities and policy discussions on important societal issues.

3.4 STRUCTURAL AND SYSTEMIC CHALLENGES

3.4.1 The Financial and Mental Health Issues

Financial precarity represents the most alarming systematic challenge across countries. The Italian documentation presents particularly concerning data: "Half of PhD students exhibit scores for depression, anxiety, and stress that could be clinically significant." This mental health crisis is directly linked to financial precarity: "The minimum scholarship established by the Ministry of University and Research (MUR) remains considerably lower than the national average salary."

The workload compounds these stresses. Italian data shows "more than half of PhD students report working over 40 hours per week, with a significant proportion exceeding 50 hours." Norwegian

students face similar pressures with "rigorous research demands, time constraints, financial pressures, high academic standards, and maintaining a work-life balance."

Turkish students describe how "financial constraints make it difficult for many PhD students to focus solely on research," while Polish students face a system where "the state sector, particularly academia, tends to offer little opportunity for internal mobility," forcing many to consider "pursuing their careers outside of Poland."

3.4.2 Brain Drain and Talent Retention Challenges

Systematic talent migration affects multiple countries as graduates seek opportunities abroad due to limited domestic academic and research positions. This creates ongoing challenges for institutional capacity building and national research development, particularly affecting countries with emerging research ecosystems.

Türkiye manages rapid higher education expansion that has strained academic staffing and quality maintenance, contributing to brain drain where talented graduates seek opportunities abroad. Georgian graduates face fundamental infrastructure limitations and weak university-industry connections, creating systematic incentives for migration where domestic opportunities remain limited.

3.4.3 Quality Assurance and Implementation Gaps

Quality assurance variations create inconsistent student experiences even within the same national frameworks. Some institutions provide comprehensive support while others rely on minimal compliance with regulatory requirements, creating systematic inequalities in educational quality and outcomes.

Countries face unique structural challenges requiring specialised responses. Cyprus confronts limited research funding relative to programme numbers and market capacity constraints. Georgia addresses fundamental infrastructure limitations, particularly the disconnect between research institutes and universities that limits students' practical research exposure.

Implementation gaps persist where sophisticated regulatory frameworks exist but lack systematic implementation mechanisms. While Türkiye, Spain, and Italy demonstrate advanced policy recognition of doctoral education's societal importance, implementation remains constrained by cultural barriers, resource limitations, and institutional resistance to fundamental change.

3.4.4 Administrative and Bureaucratic Obstacles

Complex administrative requirements consume time and resources that could support student development and research progress. Bureaucratic procedures and regulatory compliance create obstacles to programme innovation and effectiveness while failing to address fundamental quality and preparation gaps.

Institutional capacity limitations vary significantly across countries and institutions, creating systematic inequalities where student experiences depend heavily on institutional resources rather than consistent national standards. These variations compound existing challenges and undermine efforts to ensure equitable access to quality doctoral education.

4 RECOMMENDATIONS FOR DOCTORAL EDUCATION REFORM

Based on analysis of challenges across ten European countries and stakeholder input from 160 participants, these recommendations present a comprehensive framework for transforming doctoral education across three interconnected dimensions: developing essential competencies that prepare graduates for diverse career trajectories, restructuring institutional infrastructure to provide adequate support and guidance systems, and implementing system-level policy reforms that align doctoral education with societal needs and contemporary professional realities. This multifaceted approach recognises that meaningful reform requires simultaneous action at the individual skill level, institutional practice and broader policy framework to create sustainable change that benefits students, institutions, and society.

4.1. CORE COMPETENCY DEVELOPMENT

Research Application and Methodological Adaptability

Contemporary doctoral education must bridge the gap between theoretical mastery and practical application of knowledge. These interventions should be carefully designed to maintain academic rigor while exposing students to the different pace, priorities, and evaluation criteria that characterise industry, government, and non-profit research contexts.

Training in adaptability and continuous learning becomes essential as employers consistently seek graduates who can quickly master emerging technologies, navigate interdisciplinary challenges, and contribute to teams with diverse expertise and working styles.

Apart from the training mode, other approaches such as structured external placements and internships can provide meaningful exposure to research implementation in non-academic environments.

Project Management and Career Planning

The foundation of doctoral education reform lies in systematically integrating project and time management training throughout the degree journey, moving beyond optional workshops to embedded skill development. This transformation requires doctoral programmes to help students set clear timelines, manage the complexities of extended research projects, and develop organisational capabilities that prove essential across all career trajectories.

Career planning support must begin early in the programme, creating structured opportunities for students to identify their transferable skills, understand diverse job market requirements, and cultivate professional networks that extend far beyond traditional academic circles. Such comprehensive preparation ensures that students can articulate their value proposition to employers across sectors while maintaining confidence in their career choices.

Grant Writing and Entrepreneurship

Systematic training in funding acquisition, proposal writing, and entrepreneurial thinking must encompass both technical competencies and strategic understanding of research funding landscapes, project design principles, and partnership development. This preparation extends beyond academic grant applications to include industry funding mechanisms, collaborative research proposals, and innovative approaches to research commercialisation. These competencies significantly enhance career prospects across university and industry contexts where research funding capabilities are increasingly valued and where graduates must demonstrate both intellectual creativity and practical implementation skills.

Research Ethics for Diverse Contexts

Ethics training must evolve beyond traditional academic frameworks to address the complex challenges graduates face when conducting research across different professional environments. This includes emerging considerations such as responsible AI use, industry research standards, data privacy regulations, and ethical decision-making in contexts where research standards, timelines, and stakeholder expectations may differ significantly from academic norms. Such comprehensive ethical preparation ensures graduates can maintain research integrity while adapting to the diverse professional contexts where their skills will be applied.

Strengthening Multi-Stakeholder Communication

Effective doctoral education requires targeted training that equips students to communicate with practitioners, policymakers, community members, and media rather than relying on generic communication workshops. This specialised preparation involves understanding the distinct information needs, decision-making processes, and communication preferences of different professional audiences. Students must develop capabilities in digital engagement strategies, intercultural communication, including UN sustainable development goals and climate change, and the sophisticated skill of translating complex research findings into accessible, actionable insights for diverse stakeholders while maintaining scientific accuracy and nuance.

Building Collaboration Excellence

The modern research landscape demands graduates who can navigate both academic collaboration and the broader teamwork dynamics required in industry, government, and non-profit contexts. This preparation involves understanding different institutional cultures, working styles, and success metrics across sectors. Students need training in cross-sector partnership development, learning to navigate

the different institutional logics that govern various professional environments, and developing skills to manage the productive tensions that can arise between academic goals and practical implementation constraints while maintaining research integrity and collaborative relationships.

Strengthening foundation for Community Partnership and Co-Creation

Doctoral programmes must integrate participatory research design training into core methodology courses, developing students' competencies in authentic stakeholder engagement, comprehensive community asset assessment, and collaborative evaluation approaches. This transformation ensures that research questions emerge from genuine societal needs and community priorities rather than purely academic interests, while simultaneously maintaining rigorous research standards and methodological integrity. Such preparation requires students to develop cultural sensitivity, active listening skills, and the ability to navigate power dynamics inherent in community-university partnerships.

Improving mechanisms of communicating science to general public (Research translation and enhancing social impact)

Students require systematic preparation in bridging the persistent gaps between research findings and practical application through structured exposure to real-world implementation environments and comprehensive training in knowledge translation strategies. This involves understanding how research evidence is received, interpreted, and applied in different organisational contexts, as well as developing skills in impact communication that can influence policy and practice. Mandatory industry and community placements should extend beyond simple exposure to include structured reflection processes, competency development activities, and mentored practice in translating research insights into actionable recommendations for diverse professional contexts.

4.2. INSTITUTIONAL SUPPORT INFRASTRUCTURE REFORMS

Comprehensive Supervisory Training

The transformation of doctoral education fundamentally depends on reimagining the role of supervisors to encompass both academic mentorship and practical career guidance, particularly given that the majority of graduates will ultimately work outside traditional university settings. This expanded conception of supervision requires systematic training programmes that prepare faculty to support diverse career pathways, understand industry requirements and expectations, and facilitate students' successful transitions to non-academic contexts. Implementation must include comprehensive training curricula, clearly defined quality standards for supervision, ongoing professional development support for supervisors, and meaningful institutional recognition for mentorship contributions that currently receive insufficient acknowledgment in academic reward systems.

Multi-Supervisor Models

The implementation of co-supervision and collaborative mentorship models that deliberately include external partners and industry professionals addresses the inherent risks associated with poor student-supervisor matches while providing the multiple perspectives and distributed expertise essential for comprehensive career preparation. These models recognise that no single supervisor can possess expertise across all the competency areas that contemporary doctoral graduates require, from technical research skills to industry knowledge to entrepreneurial thinking. Effective multi-supervisor arrangements create opportunities for students to access diverse professional networks, understand different working styles and institutional cultures, and receive guidance that reflects the complexity of modern career trajectories.

Integrated Wellbeing Support for PhD students

The systematic integration of mental health and wellbeing support throughout doctoral programmes represents a critical shift from reactive crisis intervention to proactive, preventive care that addresses the unique psychological challenges of doctoral education. This comprehensive approach includes regular wellness check-ins that normalise discussions about stress and mental health, professional counseling services specifically trained to understand the particular pressures and uncertainties of doctoral study, peer support networks that reduce isolation and build community, and work-life balance training that benefits both students and supervisors. Such systems acknowledge that doctoral education's extended timeline, uncertain outcomes, and intensive individual work create distinctive mental health challenges that require specialised understanding and support.

Improving Financial Support Frameworks for PhD students

The establishment of minimum stipend standards aligned with national living wages represents both a practical necessity and an ethical imperative, recognising doctoral students as developing professionals rather than apprentices or cheap labour. These frameworks must include additional support for research expenses, conference participation, and professional development activities that are essential for career preparation but often require students to choose between basic living expenses and professional advancement. This financial restructuring acknowledges doctoral education as legitimate professional training that requires adequate working conditions, fair remuneration, and respect for students' contributions to research and institutional missions.

Enhancing Industry-Academia Integration infrastructure

The development of systematic partnerships through formal collaboration agreements, co-supervision arrangements, structured internship programmes, and applied research opportunities requires institutional commitment that extends beyond individual faculty initiatives or episodic industry connections. These partnerships must be designed to provide genuine mutual benefits, ensuring that industry partners gain access to cutting-edge research and fresh perspectives while students receive meaningful exposure to professional contexts, practical problem-solving approaches, and career development opportunities. Successful integration requires careful attention to aligning academic timelines with industry needs, balancing research rigor with practical application, and creating sustainable relationship structures that can evolve and deepen over time.

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4.3. SYSTEM-LEVEL POLICY REFORMS

Introducing Cross-Sector Recognition Policies

The development of comprehensive recognition policies requires ensuring that PhD qualifications receive appropriate consideration in public and private sector recruitment and advancement practices through systematic documentation of the enhanced competencies and demonstrated impact outcomes that doctoral education provides. This recognition must move beyond simple credential requirements to encompass the sophisticated analytical thinking, project management capabilities, problem-solving skills, and research competencies that doctoral graduates bring to diverse professional contexts. Such policies require collaboration among universities, professional associations, and employers to create a shared understanding of doctoral competencies and their value across different career trajectories and organisational needs.

Institutional Reward System Alignment for societal mission

The reform of evaluation criteria to systematically recognise societal engagement and impact preparation alongside traditional academic outputs represents a fundamental shift in how universities define and measure success in doctoral education. This transformation requires developing new metrics that value community engagement, applied research, cross-sector collaboration, and knowledge translation while maintaining rigorous research quality standards and encouraging innovation in doctoral education approaches. Institutional reward systems must evolve to recognise faculty who invest time in industry partnerships, community engagement, and student career development as legitimate and valuable scholarly activities that contribute to institutional mission and societal impact.

Embedding Competency-Based Assessment approach in Quality Assurance Systems

The implementation of systematic evaluation processes that track graduates' application of boundary spanning, collaborative leadership, and impact communication capabilities in societal contexts represents a paradigm shift from traditional academic assessment to comprehensive competency evaluation. These systems must extend beyond immediate skill demonstration to include longitudinal tracking of competency development over career progression, understanding how doctoral graduates apply and adapt their skills in different professional environments. Such assessment requires developing new methodologies that can capture the complex, often intangible ways that doctoral education contributes to professional effectiveness and societal impact across diverse career pathways.

Tracking impact and increasing responsibility

The establishment of comprehensive systems to document graduates' societal contributions through systematic tracking of career outcomes, impact achievements, and competency application across diverse sectors creates the evidence base necessary for continuous programme improvement and stakeholder confidence. This tracking must move beyond simple employment statistics to understand

how doctoral graduates contribute to innovation, problem-solving, and knowledge advancement in their chosen fields. Effective systems require collaboration with graduates, employers, and community partners to develop meaningful metrics that capture both immediate post-graduation outcomes and longer-term career development patterns that demonstrate the lasting value of doctoral education investment.

Enhancing International cooperation for skills development

The development of systematic funding mechanisms and administrative support ensuring equitable access to international research experiences addresses current inequalities where individual financial resources rather than academic merit or learning needs determine access to transformative international opportunities. These systems must recognise that international collaboration enhances not only individual student development but also institutional research capacity and global knowledge networks. Effective international collaboration requires reducing administrative barriers, creating sustainable funding models, and developing partnership frameworks that facilitate meaningful exchange and collaboration rather than brief, superficial international experiences.

These recommendations require coordinated implementation across institutional, national, and international levels to achieve the fundamental transformation needed to align doctoral education with 21st-century career realities and societal needs.

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5 Conclusions

The comparative analysis reveals both convergent trends and persistent variations across European doctoral education systems. While all countries demonstrate commitment to research excellence and quality assurance, approaches to structure, supervision, and skills development vary significantly. Successful reforms require coordinated efforts addressing funding sustainability, supervision quality, career preparation, and systematic skills integration.

The evidence suggests that effective doctoral education systems balance academic rigor with practical relevance, individual mentorship with systematic support, and national standards with institutional innovation. Countries demonstrating the most positive outcomes typically provide comprehensive supervisor training, systematic skills development, strong industry connections, and adequate resource allocation.

However, career preparation deficiencies persist across countries, particularly for non-academic pathways. Students consistently report inadequate preparation for industry transitions, entrepreneurship, and public sector roles. **While most doctoral graduates ultimately work outside academia, programmes remain primarily designed for academic career preparation.** Indeed, a critical gap exists across all countries in preparing doctoral graduates for careers outside academia. Despite evidence that 60-80% of PhD holders work outside universities, programmes remain primarily designed for academic career paths. This mismatch creates substantial challenges for graduate employability and represents inefficient use of doctoral education investments.

Systematic disconnect between academic training and workplace requirements exists across all countries. Employers consistently report that graduates lack practical application skills, team leadership capabilities, and understanding of commercial constraints, indicating fundamental gaps in programme design. In addition, all ten countries demonstrate systematic failure to integrate global citizenship and sustainability competencies. Despite international commitments to sustainable development, doctoral programmes across all tiers lack structured approaches to climate change education and UN SDG integration. This represents a fundamental misalignment between global priorities and doctoral education content.

Practical application limitations create disconnects between academic training and workplace requirements. Employers across countries note that graduates demonstrate strong analytical capabilities but struggle with team leadership, stakeholder communication, and adaptation to fast-paced environments. Programmes may offer individual workshops or training sessions without systematic integration into overall doctoral education frameworks.

Academic reward systems are mostly focused on quantitative outputs and overlook societal impact activities. This creates systematic disincentives for graduates to pursue societal engagement and for institutions to support such activities, fundamentally undermining impact preparation efforts.

Systematic gaps exist in institutional accountability for graduates' societal preparation and contribution, creating inconsistent support and preparation quality across programmes and institutions. These accountability gaps reflect deeper issues about institutional mission alignment and resource allocation priorities.

Early-career researchers often face challenges in two critical areas: translating research findings into practical implementation and adapting their communication style from academic discourse to accessible language that resonates with general audiences. This gap manifests in several ways: limited stakeholder engagement by students and young researchers, weak industry linkages, and poor commercialization of research outputs. The problem is particularly severe in countries that lack systematic pathways for translating research into practice.

The above-described existing gaps across all project participant countries exert inevitable influence on students, however, these influences have even broader spillover effects at the institutions, communities and even national economies.

Students represent a breakdown in human capital development. Yet, students across all countries often come across negative emotions during their studies and feel unprepared for non-academic careers. This problem creates particularly acute international competitiveness deficits for students in emerging economy countries, who face systematic disadvantages when competing in global academic job markets. Furthermore, the limited emphasis on entrepreneurship development significantly constrains graduates' capacity to commercialise their research and contribute meaningfully to economic development, creating long-term innovation capacity limitations that extend far beyond individual career outcomes.

Institutional impacts emerge through the absence of systematic supervisor training, which creates persistent quality variation that undermines the consistency of doctoral education outcomes. This inconsistency, combined with poor career preparation, leads to significant resource inefficiency as institutions fail to realise adequate returns on their substantial investments in doctoral education programmes. These deficiencies also pose serious reputation risks, as gaps in graduate preparation can severely undermine institutional competitiveness in international academic markets and collaborative partnerships.

Societal impact gaps are evident in the universal failure to meaningfully integrate UN Sustainable Development Goals into doctoral training, creating a fundamental misalignment with global sustainability efforts at precisely the moment when such expertise is most critically needed. Simultaneously, limited industry collaboration reduces the societal benefit that could be derived from substantial public and private research investments. These challenges are compounded by significant communication gaps that limit public understanding and support for research, creating public engagement failures that isolate academic work from broader societal needs and priorities.

Contextual impacts are revealed through documented skill gaps that contribute directly to accelerating brain drain, as doctoral graduates from emerging economy countries emigrate to seek opportunities that better match their training and career aspirations. This emigration pattern creates a persistent innovation deficit, as limited entrepreneurship training and industry collaboration systematically reduce national innovation capacity. Perhaps most critically, the widespread gaps in impact assessment and behavioural change skills create systematic research translation failures, limiting nations' ability to realise tangible benefits from their investments in advanced research training and limiting their capacity to address pressing national and global challenges through evidence-based solutions.

Proposed solutions include targeted training initiatives that would address the most pressing needs identified across countries. These might include:

- Training in Professional Skills, specifically - Project and Time Management, Career Planning and Employability, Grant Writing and Funding, including research proposal evaluation and project management - to address the gap between academic research and the demands of both academic and non-academic job markets.
- Training in Interpersonal and Communication Skills, specifically - Supervisor Communication and Expectation Management, Collaboration and Teamwork including intercultural environments - to help students clearly express their needs, advocate their interests and work in teams.
- Training in Community related Skills, specifically - defining and addressing needs of society, involvement of local communities, theory for change, behavioural change and impact risk assessment, transformative research, global citizenship, climate change, multiculturalism, diversity, the UN sustainable development goals - to enhance translation of research findings into helping society.

Future development should focus on systematic implementation of evidence-based practices, enhanced coordination between stakeholders, and continuous adaptation to evolving societal needs. The goal must be doctoral education that serves both individual student development and broader societal contributions while maintaining the highest standards of academic excellence.

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Appendices

Appendix 1:

Table 4. Overview of the doctoral programmes

	Structured Programmes	Hybrid Models	Flexible Approach
Countries	Poland, Spain, Türkiye, Georgia	Cyprus, Finland, Italy, Norway, UK	Denmark
Programme Structure	Dominant coursework alongside research. For example, Poland's Doctoral Schools are four-year programmes with required courses, seminars, and lab work.	Blends structured coursework with research flexibility. The UK has both traditional PhDs and more structured Doctoral Training Programmes (DTPs).	Primarily unstructured, emphasizing independent research. While mandatory courses are required (approx. 30 ECTS), the main focus is the dissertation.
Supervision Model	Individual supervision is the norm, with one primary supervisor acting as a mentor in a traditional academic apprenticeship model.	Committee-based supervision is common. For example, Cyprus uses a Doctoral Advisory Committee with at least three members, and the UK typically assigns two supervisors.	Hybrid approaches combine individual supervision with collective feedback formats where PhD students and senior staff meet for group discussions.
Regulatory Framework	Centralized national regulation is strong. National bodies like Türkiye‘s Council of Higher Education (YÖK) standardize requirements across all institutions.	Dual regulatory systems balance national standards with institutional autonomy. The UK provides universities with considerable freedom within a national Quality Code.	A blend of national PhD regulations and university-specific approaches through doctoral schools.
Professional Focus	Primarily research-focused. Poland has an "implementation doctorate" that combines research with industry experience, but this is an exception.	Advanced development of professional doctorates (e.g., EdD, DBA in the UK). Industrial PhDs and other collaborative programmes are also common.	Offers Industrial PhDs through a national foundation, which combines company employment with university enrollment.

Appendix 2: Detailed Country-Specific Gap Analysis Tables

Table 5. Country Group Overview - Transversal Skills Development Gaps

Country Group	Countries	Critical Deficiencies	Impact Assessment
Group 1	Denmark, Finland, Norway, UK	Entrepreneurship integration remains an area for development despite recognition Impact and behavioural change skills exist but would benefit from more systematic embedding Industry collaboration exists but could be enhanced to better translate into practical skill development	Well-developed systems with persistent specialised gaps requiring targeted interventions
Group 2	Cyprus, Italy, Spain	Introduction of systematic supervisor training would help ensure more consistent quality International integration could be strengthened despite European context Entrepreneurship programmes exist but would benefit from expanded reach to more students Variable institutional implementation creates opportunities to share best practices	Implementation challenges that could be addressed to improve programme effectiveness and student equity
Group 3	Georgia, Poland, Turkey	Would benefit from implementing systematic supervisor training programmes Strengthening international integration could help connect students with global research communities Developing industry collaboration would enhance career preparation effectiveness Expanding collaborative pedagogical approaches could help develop essential teamwork competencies	Foundational gaps that would benefit from systematic development and substantial investment

Table 6. Group 2 and 3 Country-Specific solutions, offered by stakeholders

Country	Proposed solutions	Envisioned impact
Georgia	Would benefit from systematic supervisor training for all 1,500+ doctoral students Strengthening international integration could help connect students with global research networks Developing industry-academia links would enhance career preparation Expanding entrepreneurship skills development opportunities Enhancing preparation for applied research and policy application Addressing financial constraints to expand development opportunities	Addressing these areas would support Georgian doctoral graduates' competitiveness in international job markets and strengthen the country's research capacity development
Poland	Expanding collaborative pedagogical approaches could help develop teamwork competencies Strengthening international opportunities despite EU membership Better utilizing available supervisor training programmes Creating more systematic extra-curricular opportunities to improve access equity Addressing work-life balance challenges through improved financial support	Despite recent reforms, addressing these areas would better prepare students for collaborative research environments and diverse career paths
Türkiye	Implementing systematic supervisor training for 11,309+ active doctoral programmes Addressing language barriers to strengthen international integration Expanding entrepreneurship training to support economic development needs Bridging the gap between theoretical training and industry practice Creating more flexibility in programme innovation while maintaining quality standards	Addressing these areas would strengthen Türkiye's capacity to develop competitive doctoral graduates and support talent retention
Cyprus	Expanding entrepreneurship training to support the small economy's innovation needs Introducing systematic supervisor training to enhance programme quality Developing industry-academia collaboration opportunities Strengthening impact and behavioural change skill development	Despite smaller scale, addressing these areas would create significant positive impacts on national research capacity and graduate competitiveness
Italy	Introducing systematic supervisor training to ensure more consistent student experiences Strengthening systematic societal impact focus to build on strong research traditions Enhancing entrepreneurship integration across programmes Improving institutional implementation consistency to address equity concerns	Addressing these areas would help Italy maximize returns on substantial doctoral education investments and enhance graduate preparation for diverse career paths
Spain	Implementing systematic supervisor training despite recognition of its importance	Addressing these areas would help Spain maximize returns on substantial doctoral education investments and

Country	Proposed solutions	Envisioned impact
	Improving institutional implementation consistency to enhance programme effectiveness Strengthening industry alignment to support economic development priorities Creating more consistent transversal skills embedding across programmes	better prepare graduates for evolving labour markets

Table 7. Within-Country Variations and Access Disparities

Type of Disparity	Description	Countries Most Affected	Potential Solutions
Geographic Disparities	Students in smaller institutions and rural locations face systematic disadvantages in accessing skill development opportunities	Georgia, Poland, Türkiye (most evident)	Online delivery options Regional coordination Mobile training programmes
Institutional Size Disparities	Larger institutions typically offer more comprehensive extra-curricular programming	All countries	Inter-institutional collaboration Shared resource programmes National coordination initiatives
Study Mode Exclusion	Extra-curricular programming typically assumes full-time, on-campus presence, excluding part-time and distance learning students	All countries	Flexible delivery format Evening and weekend options Virtual participation opportunities
Resource Access Inequities	Students at institutions with limited resources have fewer development opportunities	Group 3 countries particularly	National funding support Resource sharing agreements External partnership development

Appendix 3: Detailed information about the sample characteristics presented by stakeholder group

Doctoral Students and Early Career Researchers (n=54)

Age Distribution:

- Under 25 years: 2 participants (Cyprus)
- 25-34 years: 29 participants (majority group, including all 5 Türkiye participants)
- 35-44 years: 12 participants
- 45-54 years: 3 participants
- Age not specified: 8 participants (Denmark, Norway)

Fields of Study:

- STEM fields (52%): Life Sciences, Engineering, Biology, Oceanography, Neurosciences, Biochemistry, Biotechnology, Environmental Sciences, Automation/Electronics
- Humanities (26%): Cultural Studies, Pedagogy, Classics, Music Education, Applied Linguistics
- Social Sciences (22%): Legal Sciences, Education, Clinical Medicine, Science Education, Measurement & Assessment

PhD Stage:

- Early stage: 30%
- Mid-stage: 35%
- Final stage: 26%
- Completed (ECR): 9%

Institution Type:

- Public universities: 78%
- Private institutions: 22%

Notable Characteristics:

- International diversity (UK sample: 4 African, 3 European, 1 Latin American, 1 Asian)
- Mixed funding sources (scholarships, Erasmus Plus, EducaDoc pilot, unemployment benefits)
- Combination of full-time and part-time students

Supervisors (n=36)

Demographics:

- Gender: 61% female, 39% male (where specified)
- Age: Predominantly 45-54 years (69%), with representation from 35-44 years (25%)

Experience Level:

- 3-10 years: 22%
- 11-20 years: 67%
- 20+ years: 11%

Fields of Supervision:

- Life Sciences/Natural Sciences: 31%
- Engineering/Technology: 25%
- Humanities: 22%
- Social Sciences: 17%

- Business/Economics: 5%

Institution Types:

- Public universities: 72%
- Private institutions: 28%

University Administrators (n=32)

Positions:

- Programme directors/coordinators: 42%
- Vice-rectors/senior administrators: 30%
- Faculty deans: 15%
- National policy representatives: 6%
- Research coordinators: 7%

Experience:

- 5-10 years: 36%
- 11-20 years: 48%
- 20+ years: 16%

Age Distribution:

- 35-44 years: 9%
- 45-54 years: 73%
- 55+ years: 18%

Scope of Responsibility:

- Faculty-level coordination: 55%
- Institution-wide oversight: 33%
- National policy level: 12%

Employers (n=37)

Sector Distribution:

- Private sector: 53%
- Public sector: 32%
- Non-profit/Third sector: 8%
- Research institutes: 7%

Organization Types:

- Research institutes/Think tanks: 34%
- Technology/Engineering companies: 24%
- Educational institutions: 18%
- Consulting/Analytics: 13%
- Healthcare organizations: 8%
- Municipal government: 3%

Managerial Level:

- Senior management/Directors: 58%
- Middle management: 26%
- HR professionals: 16%

PhD Status among Employers:

- Hold PhD degrees: 45%
- No PhD: 55%

Geographic Representation:

- Urban centers: 71%
- Smaller municipalities/regional: 29%