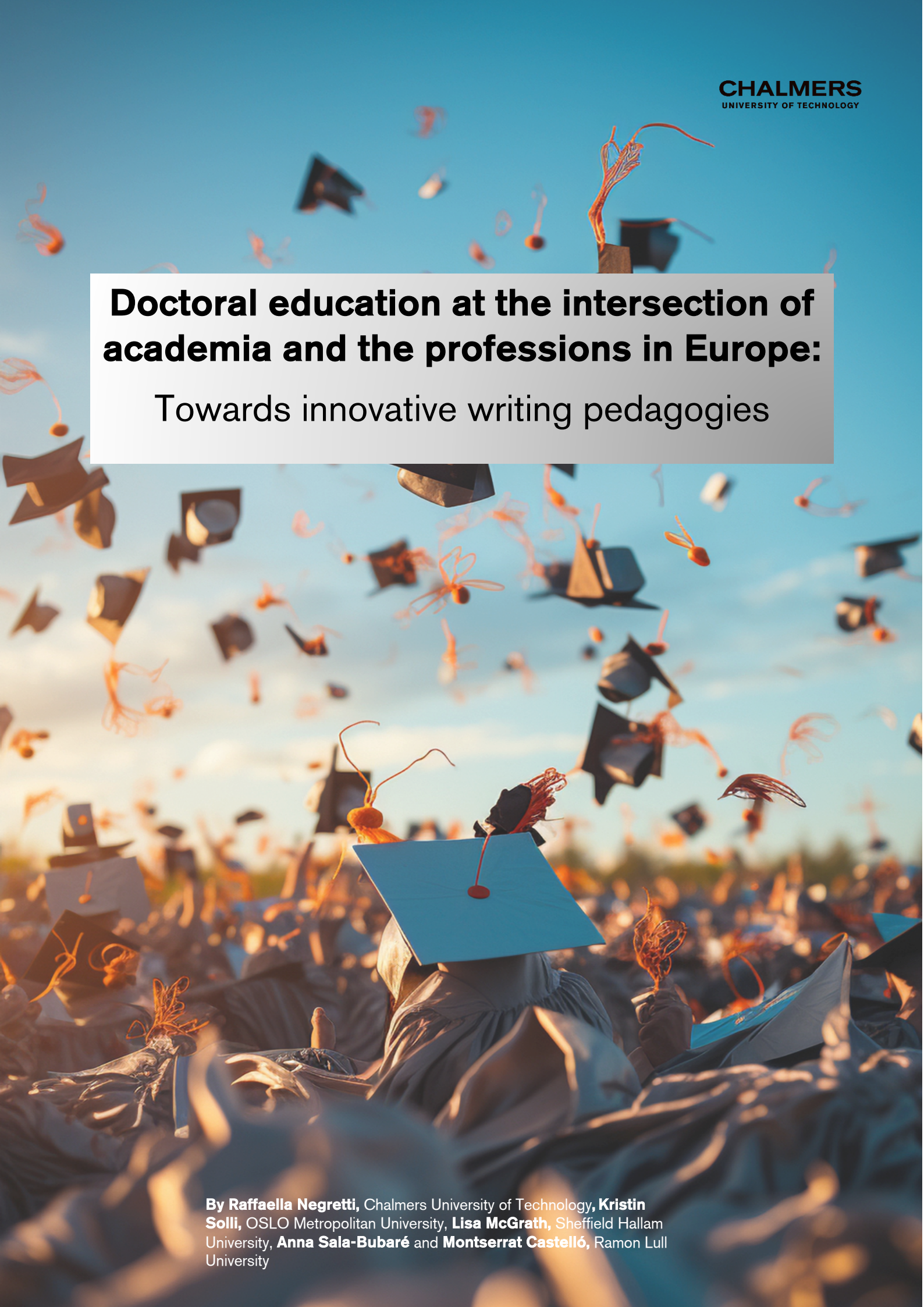

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# Doctoral education at the intersection of academia and the professions in Europe:

## Towards innovative writing pedagogies

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# Content

# Summary


**Doctoral education at the intersection of academia and the professions in Europe: towards innovative writing pedagogies**

This report summarizes a collaborative, international groundwork done with the support of a Riksbanken Jubileumsfond initiation grant. This work focused on gathering information about the status of doctoral education in Europe, especially at the intersection between academia and the professional world. The collaboration involved an international, interdisciplinary group of researchers with a strong background in doctoral education, who over a year met, discussed, and investigated the current educational situation for industrial/professional PhDs in four countries: Sweden, Norway, Spain (*Catalunya*), and the United Kingdom. The collaboration aimed at pooling knowledge from existing research, as well as experiences and perspectives from professional educators. Specifically, we examined professional and industrial doctorates and identified potential needs and challenges as well as the role of writing and other genres of knowledge communication in doctoral training. This report encapsulates the outcomes of this work. After a synopsis of key relevant research, we summarize the educational challenges and needs of doctoral education in these four European contexts and report on what we learned from polling colleagues at conferences and through our network. We conclude with some recommendations for supervisors, directors of studies, and other stakeholders involved in industrial/professional doctoral education, and anyone committed to fostering high-quality doctoral education and facilitating PhDs graduates' transition to the professional world. We believe that this contribution is both timely and scientifically relevant due to the changing landscape of doctoral education, which increasingly encompasses partnerships with professional entities, governmental organizations, and the industry.

**Forskarutbildning i skärningspunkten mellan akademi och yrkesroll i Europa: mot innovativ skrivpedagogik**

Denna rapport sammanfattar en internationell samverkan som gjorts med stöd av ett initieringsbidrag från Riksbanken Jubileumsfond. Detta arbete fokuserade på att samla information om nuläget för forskarutbildningen i Europa, särskilt i skärningspunkten mellan akademin och yrkesvärlden. Samarbetet involverade en internationell, tvärvetenskaplig grupp av forskare med en stark bakgrund inom forskarutbildning, som under ett år träffade, diskuterade och undersökte den aktuella utbildningssituationen för industri-/yrkesdoktorer i fyra länder: Sverige, Norge, Spanien (Katalonien), och Storbritannien. Samarbetet syftade till att samla kunskap från befintlig forskning, samt erfarenheter och perspektiv från forskare och pedagoger inom doktorandutbildning. Specifikt, undersökte vi professionella och industriella doktorer och identifierade potentiella behov och utmaningar som de upplever kring vetenskaplig skrivandet och andra genrer av kunskapskommunikation. Denna rapport summerar resultaten av detta arbete. Efter en sammanfattning av viktig relevant forskning, sammanfattar vi utbildningsutmaningarna och behoven av forskarutbildning i fyra europeiska sammanhang, och rapporterar om vad vi lärt oss av kollegor från diskussioner på konferenser och genom vårt nätverk. Vi avslutar med några rekommendationer för handledare, studierektorer och andra utbildningspersonal involverade i industriell/professionell forskarutbildning, och alla som är engagerade i att främja högkvalitativ forskarutbildning och underlätta disputerades övergång till yrkesvärlden. Vi tror att detta bidrag är både aktuellt och vetenskapligt relevant på grund av forskarutbildningens föränderliga landskap, som i allt högre grad omfattar partnerskap med professionella enheter, statliga organisationer och industrin.

# Introduction

Universities continue to generate discipline-focused, theoretical research, yet most doctoral programs nowadays also aim to prepare PhD graduates for professional careers. New types of doctoral education are emerging that entail a collaboration between academia and industry (Sarrico, 2022). Doctoral education is "no longer exclusively considered as the pursuit of knowledge, but as a resource for fostering the growth and competitiveness of countries" (Compagnucci & Spigarelli, 2024, p. 2). This shift runs in parallel with the increasing number of doctoral students who leave academia after graduation (Germain-Alamartine et al, 2020; Sala-Bubaré et al., 2023; Moore & Morton, 2017; UKÄ, 2021a). Furthermore, universities' additional role in re-training the workforce has resulted in an increasing number of alternative PhDs: doctoral students whose education is fully or partially funded by governmental or professional organizations, such as vocational, industrial, and other professional PhDs. As pointed out by the European Association Council for Doctoral Education, these types of doctorates are becoming established and are growing in numbers in various countries such as China and South Africa and are seen as "one of the key strengths of doctoral education" (Smith McGloin & Wynne, 2022, p. 35).

> While this changing landscape results in different kinds of doctoral programs across countries and institutions (Taylor, 2023), a commonality of these PhD programs is the need for students to learn to write.

The problem, however, is that PhD students' writing needs have become more varied and complex, and current doctoral programs do not prepare students to write for communicative situations beyond the academy (Inouye & McAlpine, 2022). In other words, rather than becoming experts at writing academic genres, doctoral graduates should become skilful at adapting their writing to different purposes and audiences (Moore & Morton, 2017).

This report presents insights gathered from a research initiative funded by the *Riksbanken Jubileumsfond* to investigate current changes in professional and industrial doctorates. The initiative fostered the collaboration of an international, interdisciplinary research team—scholars in educational psychology, applied linguistics, and cultural studies—with strong expertise in doctoral education, embedded into some of the most representative European and international writing research associations (e.g. IDERN, ISAWR, EARLI, EARLI SIG Writing, BALEAP, and EATAW) [1].

The team met three times and presented a roundtable at the SIG Writing conference of the European Association for Learning and Instruction (EARLI) in June 2024 to gather further insights from international

[1] Links to Educational Associations:
https://www.mun.ca/educ/research/int-doctoral-education-research-network-idern/
https://www.isawr.org/
https://www.earli.org/
https://www.earli.org/sig/sig-12-writing
https://www.baleap.org/
https://www.eataw.eu/

experts and colleagues in other institutions.

The objective of this initiative was therefore to establish a solid groundwork upon which to develop a future research project that:

a) Identifies the types of writing undertaken by PhD students on industrial/professional programs beyond academia;

b) Develops innovative approaches for doctoral writing education, equipping doctoral students to write effectively across both academic and professional contexts;

c) Responds to current European calls for lifelong learning and high-quality doctoral education (cf. OECD, 2023).

In this report, we summarize what we learned from the research literature, describe the challenges and needs that emerge from the current panorama of professional/industrial doctoral education in our respective countries/institutions, and offer some recommendations for further research and doctoral training.

# The changing landscape of doctoral education

What is doctoral education? Doctoral education is the highest level of study; it aims to train individuals to conduct research, whether in science, social science, or the humanities. The International Standard Classification of Education (ISCED), defines it as:

> An advanced research qualification, resulting from advanced study and original research typically offered by research-oriented universities, in both academic and professional fields, requiring the submission of work of publishable quality that is the product of original research and represents a significant contribution to knowledge in a field of study"
> (OECD/Eurostat/UNESCO, 2015, reported from Sarrico, 2022).

This definition emphasizes doctoral education's objective to promote original research and advance knowledge with significant academic value.

However, in most developed countries, doctoral education has changed considerably in the past few decades, both in nature and purpose. The adoption of a knowledge economy perspective (Usher, 2002) by most governments has resulted in an increased re-direction of research funding towards topics that are considered politically or socially strategic, and the belief that doctoral education should prepare individuals to enter the professional world. Knowledge economy refers to "the production and services based on knowledge-intensive activities that contribute to an accelerated pace of technical and scientific advance" (Powell and Snellman, 2004, p. 199). This perspective emphasises knowledge as having economic rather than epistemological value, a type of knowledge also referred to as "Mode 2 knowledge" (Gibbons et al, 1994; Negretti & McGrath, 2022). The implication, as Usher (2002) clarifies, is that universities are increasingly considered key actors in knowledge production, effectively contributing to the economic growth of a country, and therefore that knowledge "must be effectively and efficiently managed and locked into systems and processes that enhance innovation." (p. 144). Obviously, changed views about the role and objectives of universities have had profound consequences for doctoral education.

Doctoral education has experienced what Sarrico (2022) calls an "expansion", both in sheer number of PgD graduates, and in terms of competencies to be taught and learnt (p. 1300). Reviewing research on doctoral education published in the last 50 years in *Higher Education*, and drawing from her own work as an analyst for the OECD, Sarrico reports that in OECD countries, doctoral level attainment has increased by 25% from 2014 to 2019, while gross spending on research and development in the same period has seen an inverse trend. Not only is there less research money to go around; from a knowledge economy perspective, research funding is also increasingly channelled towards targeted areas through project-based investments, with the employment of doctoral and post-doctoral researchers as a contingent work force. The reliance on precarious doctoral and post-doctoral researchers in research work has led to an expansion of doctoral education. This expansion, however, cannot be absorbed by academia, which has seen a corresponding decrease in available tenured academic positions (Sarrico, 2002). A recent policy paper by the OECD for example, titled Promoting Diverse Career

Pathways for Doctoral and Postdoctoral Researchers, points out several concerns around limited academic employment opportunities such as potentially excellent researchers leaving academia, precarious working conditions and an increasingly unsustainable, hyper-competitive, academic, environment. The result is “an academic workforce that is very poorly representative of society as whole in terms of gender, social class and representation of minority groups. Excluding so many people from research at the outset is bad for science and bad for society as a whole.” (OECD, 2023). Overall, doctoral education has not only expanded, but also changed in nature. It is no longer an “entry ticket to academia” (Sarrico, 2002, p. 1302) but rather a way of producing a valuable work force with advanced knowledge and skills.

# New directions: professional and industrial doctorates

The knowledge economy and the shrinking number of academic jobs have spurred the emergence of new types of doctorates that entail some kind of collaboration with the professional and industrial world, such as professional or industrial doctorates (Taylor, 2023). These types of doctorates take many forms across countries and institutions, but a typical characteristic is the placement of the PhD at the intersection of academia, society and industry (Compagnucci & Spigarelli, 2024).

Industrial PhDs are doctorates that typically follow the same curriculum as academic PhDs, but they are funded through various forms of collaboration with industry and/or government. A recent review of existing research on industrial PhDs (Compagnucci & Spigarelli, 2024) shows that these types of doctorates, while advantageous to both universities and companies, are not without challenges for the students. These challenges include the increased interdisciplinarity of industrial PhD projects (cf. Negretti & McGrath, 2022), and the need to navigate and share knowledge across contexts with very different values and needs—a role that has been framed as knowledge brokering (Grimm, 2018).

> The concept of knowledge brokering as central to an industrial PhD is particularly interesting.

Brokering embodies the push for an increased collaboration between academia and the professional world, but also illustrates how this collaboration often rests on the shoulders of the individual PhD student. As Compagnucci and Spigarelli (2024) point out, research shows that brokering raises issues of identity and potential conflicts of interest, as well as the challenge of developing communicative skills to enable sharing knowledge across contexts.

Professional doctorates were introduced in the 1980s, expanded through the 1990s (Scott et al., 2004) and have continued to proliferate (Hawkes & Yerrabati, 2018). In their summary of the literature, Wildy, Peden, and Chan (2015) suggest several reasons as to why this is the case: government policy to create a more educated society to promote economic growth; demands for research-based professional development for mid-career practitioners, encouraged by professional bodies to raise the status of the profession; and "the massification of tertiary education [leading] to a more splintered doctoral field" (p. 763). In other words, the ratio of doctorates to academic jobs is now such that graduates must expect to work in professions other than the academy.

This type of doctorate spans multiple professional domains such as the Doctor of Education (EdD), Doctor of Public Health (DrPH) and Doctor of Business Administration (DBA). To give some idea of the range in subjects available (and variation in nomenclature) 308 different doctoral degrees were identified by Brown and Cooke's (2010) review in the UK alone. In terms of program delivery, like standard PhDs, professional doctoral programs are punctuated by official progression points to track progress, and candidates are supported by a

supervisory team. Where the model differs from the traditional UK PhD is the taught component in the form of assessed modules, and the thesis is usually shorter. Importantly, in terms of contribution, “in the case of professional doctorates, successful completion of the degree normally leads to professional and/or organizational change that is often direct rather than achieved through the implementation of subsequent research findings.” (QAA, 2020, p. 8). This nuance perhaps has implications for the way in which research outcomes are/should be best communicated, especially given the constraints of research degree regulations based around standard PhDs and associated expectations around how knowledge is constructed and articulated (see e.g. Dobson & Clark, 2024).

# What do doctoral students need to learn? Generic transferable skills and communication

The emergence of these professional and industrial doctorates, which are often interdisciplinary and collaborative, and the associated role of industrial PhD students as knowledge brokers, raises questions about the skills that these doctoral students (and ultimately graduates) need to learn. In her licentiate degree thesis, Cervin-Ellqvist (2022), explores the issue of what exactly these generic and transferable skills are. Typically, they are conceived as skills that are not discipline specific but are nonetheless relevant to research, such as problem solving, critical thinking, teamwork, creativity, and communication (Cumming, 2010; Moore & Morton, 2017). The main challenge tied to the notion of generic and transferable skills is that they are difficult to measure, and thus to evaluate in terms of deficiencies and instructional needs:

> "Who defines what is deficient and what is sufficient, as well as which generic skills students should acquire [?]"
> (Cervin-Ellqvist, 2022, p. 11).

In addition, how these skills should be taught, and what type of pedagogy is most effective, is also unclear.

An example of these issues is the development of students' communicative skills, and specifically their ability to communicate knowledge to various audiences both within and beyond academia. For instance, Moore and Morton (2017) point out the challenge that university graduates face in writing for professional audiences, which is due not so much to a lack of training in writing, but rather to the different communication practices in academia and industry. The authors conclude that instead of just becoming better at writing in academic genres, students need to become better at adapting their writing to different genres. Inouye and McAlpine (2022) come to the same conclusion in a more recent study, where they found that a broader understanding of writing as situated communication, if acquired during doctoral education, allows PhD students to adjust to writing in new genres in industry. Many current doctoral programs include some type of academic writing intervention but ignore the need for targeting a broad variety of communicative situations and genres (Inouye, & McAlpine, 2022; McAlpine & Inouye 2022; Negretti et al. 2022; McAlpine, Castelló, & Pyhältö, 2020). As of now, writing research has not addressed this challenge, and PhD education in Europe is still lacking in research on how to promote rhetorical flexibility across contexts and develop effective doctoral writing pedagogies (see Castelló & Sala-Bubaré, 2023; Negretti & McGrath, 2022; Negretti et al., 2023; Solli & Muir, 2021).

Science communication, the communication of scientific knowledge to non-specialists and for non-academic purposes, is another area of doctoral education that while generally considered crucial, suffers from poor or non-existent training. While science communication is valued by academics and increasingly expected for hiring and promotion (Llorente et al. 2019), researchers often do not receive any formal training in science communication skills during their doctoral education (Negretti et al, 2022; 2023). Even more concerning is that science communication training that does exist is often offered as a "tick a box" exercise for the university,

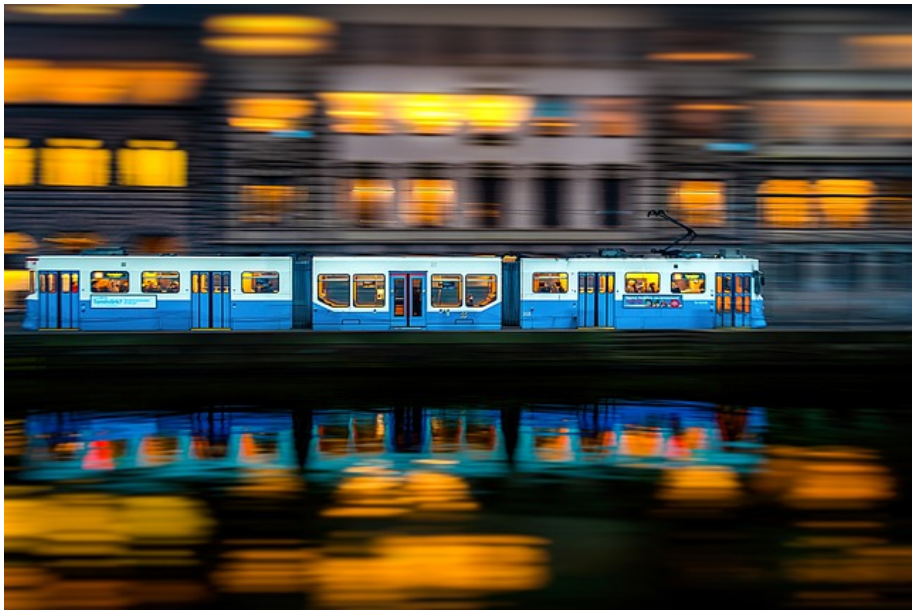
aimed at marketing purposes but with limited impact for the researchers themselves (Davies, 2020; Priest, 2018). As a result, the quality of science communication training is often poor and generic, not up to par with what should be expected at this level, and inadequate for a future skilled workforce expected to navigate diverse professional contexts. In a pointed critique of the common practices for science communication training, Fahenstock (2020) underscored how this type of training is often provided in short workshop-like sessions, offers rather generic advice that requires the researchers to figure out how to apply, and generally aims at dissemination of knowledge rather than communication, i.e. addressing an audience capable of understanding rational argumentation. Once again, communicative skills that leverage adaptability to the situation and an understanding of the audiences' expectations across contexts seem like more promising learning outcomes for doctoral graduates, especially those enrolled in professional or industrial PhDs.

The research reviewed so far points to the fact that generic transferable skills, and specifically communicative skills such as writing for diverse audiences and purposes, are a crucial yet challenging area of doctoral education, especially for professional and industrial PhDs and for PhD graduates working in non-academic sectors (Garcia-Morante et. al, 2024; Sala-Bubaré & Castelló, 2023). However, there seems to be very little research that examines these needs and challenges across different institutional and contextual situations. While we have useful insights for further large-scale research from wide-ranging meta-analyses (e.g. Boman, et al., 2021; Compagnucci & Spigarelli, 2024), and in-depth case studies of individual students' and graduates' experiences (e.g. Garcia-Morante et al., 2024, Solli & Muir, 2021), we still lack the meso-level of research: an analysis of common challenges and potentially effective practices. In this project, our objective was to begin to address this gap.

# Challenges and needs of industrial/professional doctoral education across different European contexts

In this section, we describe the educational situation in the research teams' respective educational contexts, with a focus on challenges and needs, as well as the perspectives of educational experts and colleagues in the field that emerged from a roundtable discussion at an established conference in 2024.

## Sweden



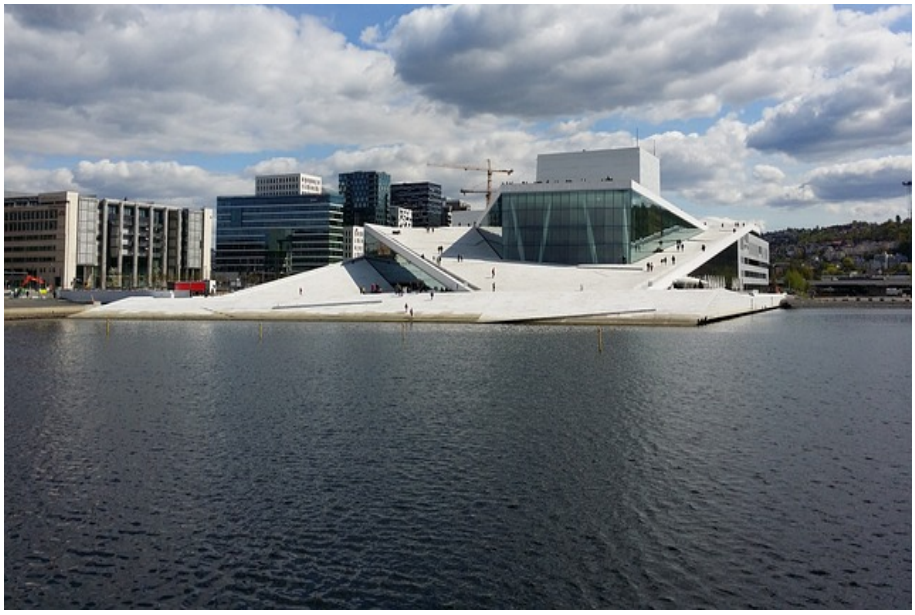
Industrial and professional PhDs in Sweden are quite well established. As of 2021, 25% of doctoral students in Sweden were financed through employment outside the university, either as industry PhDs, medical doctors, or government/professional employees (UKÄ, 2021b); for comparison, this percentage was 16% in 2016 (UKÄ, 2017). It is important to note that doctoral positions in Sweden are considered as salaried jobs, so industrial/professional PhDs are academic positions whose costs are financed through industrial collaboration or external employers, rather than the university. The increase in this type of doctoral education reflects a cultural reality where the role of academia as a key social player is well established (Bohlin & Bergman, 2019; Cervin-Ellqvist et al., 2023). On the premise that a well-functioning dialogue between academia and the public is crucial in a democratic society, Sweden has actively legislated to promote science dissemination and collaboration between academia and industry since the 1970s, with continuous amendments since (Bragesjö et al., 2012).

Chalmers University of Technology is ranked first in Sweden for collaboration with industry, and approximately 10% of its doctoral students are following industrial PhD programs. At Chalmers, there is no

teaching provision specifically targeted towards industrial PhDs. In terms of general doctoral education, provisions with a focus on science communication and writing are very limited and are focused on communication for academic purposes. Doctoral students are required to complete 7.5 credits from "Generic Transferable Skills" courses, some of which need to come from compulsory courses. Among these compulsory courses, doctoral students are offered a 1.5 credit course on "Introduction to Writing for Publication", a self-directed, online course adopting a flipped pedagogy, and encompassing topics such as critical reading of research, the writing process, peer review and feedback, genre analysis of scientific publications, and AI in research writing. The only other writing provision for doctoral students is an optional 8-weeks course titled "Academic Writing for PhD students", which guides the students through the process of writing a scientific research paper.

To identify the challenges that industrial/professional PhDs may face in these areas, a study is under way, and a survey was recently distributed to industrial PhDs across the major technical universities in Sweden (Cervin-Ellqvist et al., 2023). While the findings are still preliminary, some interesting aspects already emerge. First, most industrial PhDs seem to be more comfortable with writing academic genres, an area where they also receive more support in comparison to writing professional/industrial genres, which they seem to learn "on the job". In terms of challenges, the main one appears to be adapting communication of research knowledge to different audiences, and specifically gauging the level of knowledge of non-academic readers and communicating/translating this knowledge across contexts. As for support, industrial PhDs wish for more provisions that could help them communicate scientific work beyond academic settings.

## Norway



In Norway, two major funding schemes have been introduced to facilitate collaboration between academia and other sectors at the level of doctoral education. The Industrial PhD Scheme, established in 2008, funds projects

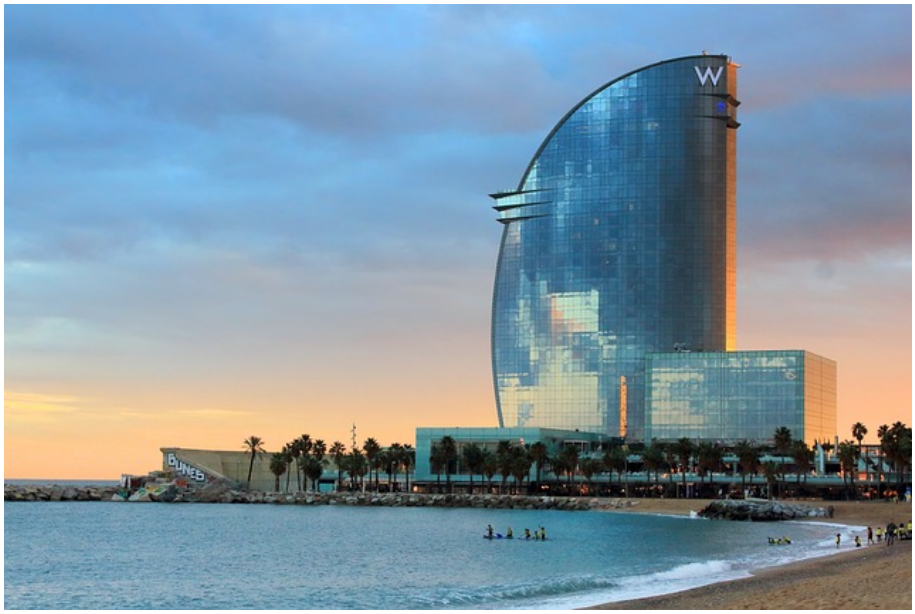
whereby doctoral candidate positions are funded 50% by a company and 50% by the Norwegian Research Council. The company is the project owner, but must collaborate with a degree-conferring institution, which is responsible for providing the doctoral candidate with a doctoral curriculum and assessment of the thesis. In 2014, the Public Sector PhD Scheme was established. This scheme is organized in much the same way as the industrial scheme, except that it targets public entities rather than companies. In addition to these funding schemes, the types of academic fields that have entered into academia in Norway have expanded, with PhD programs available in fields such as social work, nursing, teacher education, and other professions emerging over the last 15-20 years (Mausethagen et al., 2020; Prøitz & Wittek, 2020). It is important to note that all the initiatives referred to above are funding schemes. The doctoral education the candidates funded by such schemes receive is provided by 'standard' PhD programs.

OsloMet is an institution with a professional and applied profile, as suggested by their slogan 'New Knowledge – New Practice'. Many candidates enter PhD programs with backgrounds in professional fields, and some candidates are funded by the industrial and public sector schemes. In addition, the Faculty of Health Sciences has developed its own program called the "Bridge-Building Initiative," which "aims to establish closer connections between research, education, and clinical practice" (OsloMet, n.d.). Within this scheme, the candidates work 40% in a health care context, typically a hospital, and 60% at the university.

Some research on the emergence of doctoral education that seeks to foster closer collaboration between academic and other sectors in a Norwegian context exists (e.g. Thune & Børing, 2015) as well as some evaluations and reports (Mausethagen et al. 2021; Forskningsrådet 2018a; 2018b). Some studies have indicated that limited pedagogical and curricular infrastructure is in place to educate 'brokers' or 'bridge builders' and that candidates are left to do this on their own (Prøitz & Wittek, 2020, Thune 2010). There is also little research on the kind of writing and communicative skills these doctoral candidates need, although Solli & Muir (2021) have investigated how students with professional backgrounds who write a thesis by publication struggle with negotiating professional and research discourse communities. Their research suggests that these candidates could benefit from targeted writing pedagogies that take their rhetorical challenges into account.

At OsloMet there is a semester-long writing course available for doctoral candidates focused on writing for publication, but there is no systematic overview of initiatives catering to candidates engaged in such schemes and programs, locally or nationally. Hence, more research in this area is needed both to examine what might already be in place, the quality of current initiatives, and what might be needed.

## Catalunya




Catalunya, a northeast region of Spain, is pioneer in economic production within Spain. It ranked second in domestic Research, Development and Innovation -RDI- investment expenditure and first in hosting RDI companies (Instituto Nacional de Estadística [INE], 2022a; 2022b) in 2021. Catalunya is also a leading region in university efficiency and PhD training (Buela-Casal et al., 2015). In 2020, Catalunya was the Spanish region with the highest number of theses defended, according to the latest database of doctoral studies provided by the Spanish Government (INE, 2022c). It is also the region that first developed industrial doctorates, coinciding with a significant modification of Spanish regulation of PhD education in accordance with the European Higher Education Area framework development and the subsequent Bologna Declaration (AQU Catalunya, 2020), which resulted in the new Spanish national doctoral regulation (Real Decreto, 99/2011). The Industrial Doctorates Plan is a public initiative by the Government of Catalunya, launched in late 2012 in collaboration with the Catalan university and research system.

Over the past decade, industrial doctorates have proactively promoted strategic, collaborative, and applied research in Catalonia, ensuring a meaningful return for society. These industrial doctorates provide the same PhD degree as academic PhDs, with a mention. Until 2023, 916 projects have been developed in 430 research teams; 600 companies and all the Catalan Universities have been involved. Results from a recent 10-year impact evaluation of the 2013–2018 cohorts (Castelló, et al., forthcoming, 2025) highlight that industrial doctorate candidates spend more time in companies than at universities. Over 90% complete their programs. The primary reason for non-completion was the end of financial support or contracts. Graduates exhibit comparable research skills to those in traditional doctorates but excel in business-specific competencies such as entrepreneurship and result-oriented research. Employment rates for industrial doctorates are slightly higher, with graduates predominantly working in the private sector, though with lower national and international mobility. Many

companies offer job continuity post-doctorate, and graduates see notable improvements in working conditions compared to peers from traditional doctorates.

Regarding research writing outputs, most graduates publish scientific articles and, to a lesser extent, business-focused pieces. A quarter achieved patents or other data-related outputs. Challenges include communication gaps between academic and business sectors, yet stakeholders value the program's role in fostering collaboration. Graduates maintain ties with universities (sporadically) and companies (contractually). Collaborative writing practices were found to be prevalent in non-academic settings. These practices involve frequently co-authoring, editing, and providing feedback on colleagues' texts. Significant disciplinary differences were found, with humanities graduates reporting the lowest levels of collaborative writing practices and STEM graduates the highest. However, unlike academic settings where collaborative writing is often linked to enhanced engagement and reduced burnout, the protective role of collaborative writing in non-academic sectors is less pronounced. While for STEM graduates a positive correlation between collaborative writing and engagement was found, humanities graduates experience increased exhaustion when collaborating on writing tasks (Castelló & Sala-Bubaré, accepted).

## The United Kingdom

Professional doctorates constitute a “small but significant” proportion of the doctoral programs available in the UK (AQA 2020, p. 8), the EdD being the most popular (Hawkes & Yerrabati, 2018). The EdD was introduced in the UK in the 1990s, and generally the model is seen as presenting both advantages and challenges for the “time poor and experience rich” (Wildy, Peden, & Chan, 2015, p. 772) cohorts the qualification attracts. While there appears to have been an overall increase in professional doctoral programs in the UK (Mellors-Bourne, 2016), according to House (2020), the period 2008 to 2018 saw a substantial decline in enrolments, with the EdD being one of the most severe cases (Smith McGloin & Wynne, 2022).

As with other UK higher education institutions (Smith McGloin & Wynne, 2022) increased doctoral recruitment is important to Sheffield Hallam University's ongoing financial strategy. Professional doctorates are part of that strategy – the university's motto is 'knowledge applied'. In terms of the EdD, the program has welcomed its 13th cohort and continues to be viable. Students come from a range of professional practice contexts – headteachers, university-based initial teacher training providers, and those training people for careers in the national health service. Thus, the concept of education is interpreted quite broadly.

Unlike a standard PhD, the EdD program comprises four taught modules: developing your research focus, developing the literature review, research methodologies and research design, and data analysis, interpretation and presentation. Each module is assessed by an assignment of around 6000 words. Modules are delivered through taught sessions on Saturdays to cater for the students' professional commitments, alongside supervisory support. Writing development is a built-in component in these modules and writing is assessed as part of each assignment. Some evidence that this input supports the development of disciplinary writing is available through module evaluations, Donaghue and Adams (under review), and the writing development apparent in assignments as students progress through the program; however, the question of whether students can transfer and adapt this writing knowledge to other contexts (such as popular writing or writing in professional contexts), and how, remains open. Professional doctorate students can also access a suite of workshops on doctoral/research-based writing offered by the university to all doctoral students, but given the professional commitments of these students, attendance at these workshops can be problematic, and evidence of impact is again limited to student evaluations.

Looking forward, the recent UK Council for Graduate Education (2022) report concludes:

"Collaborations with industry, business and third sector [...] have the potential to address any future decline or stagnation in the level of available funding [...] Innovations in cross-sectoral partnership-working could leverage additional investment for doctoral education, increase the amount of challenge-focused, interdisciplinary and applied doctoral research undertaken, and might also in some ways address doctoral employability."

The connection between professional collaboration and doctoral employability has already started to be made in practice. For example, the Economic and Social Research Council funded White Rose Doctoral Training Partnership (DTP) has incorporated a new and compulsory "research in practice" placement on their standard funded PhD program in which students set aside their doctoral projects for three months in order to "develop their transferable skills, and to apply their theoretical knowledge and methodological skills in different contexts" (White Rose DTP). Research is needed into how these skills might be a) activated and b) transferred, particularly when it comes to the diversity of communicative skills this arrangement will call for.

## Other contexts in Europe and beyond

Thanks to our networks and through conference participation, we were also able to gather insights into the situation in other contexts - in Europe and beyond. These insights were useful to complement or confirm what we had already found out through our review of the literature, our own research, and the situation at our own institutions.

At the SIG Writing EARLI conference in June 2024, we organized a roundtable discussion. The SIG Writing conference is an established international venue where researchers of writing and experts in higher education converge.

*During the roundtable, we discussed the following questions:*

- Industrial/professional/academic doctorates with professional development aims: What kind of challenges do these doctoral candidates face? (Focus on writing)
- What kind of writing pedagogy targets the needs of this varied population?
- What type of writing interventions would be effective?

The discussion broadened out from these questions, and the following themes were raised:

*Pedagogy- what is effective and what should be done*

- Varied practice. Writing interventions should support writing that targets a variety of audiences and contexts and include writing practices that go beyond superficial lexical changes.
- Genre pedagogy. In connection to the point above, genre pedagogy typically highlights dimensions of context and purpose and how these are reflected in different genres. Effective interventions should target both genre-specific knowledge (knowing how to produce specific genres) but most importantly genre awareness (a general understanding of genres as instances of communication).

- Mentorship. Doctoral education should include opportunities for mentorship and sharing writing practices, especially communication directed towards non-academic audiences and purposes.
- Target conceptions about the nature of writing. Help students conceptualize writing as a means of thinking and knowledge creation and strengthen conceptions of writing as a process.

*Challenges*

- Positioning. Industry and academia are two very different worlds, and a key challenge for doctoral students and graduates is to identify their role and manage the expectations of these two contexts in terms of what constitutes valuable knowledge.
- Writing. A challenge is to develop writing skills both for academic and industrial/professional purposes and develop an understanding of the purposes behind the genres used in these two contexts.
- Affective dimension of the doctorate. Challenges mentioned included loneliness, motivation, and lack of confidence, and self-awareness. These affective dimensions are linked to the positioning challenge above.

Overall, it was clear in the discussion that themes, and especially what should be done in terms of pedagogy, were not reflecting the current state of affairs at their universities. These themes reflect some of the issues identified through the research we conducted and the research we reviewed for this project. Below we provide recommendations for further research and practice.

# Recommendations for stakeholders in doctoral education: research and practice

In making recommendations, we focus on three levels:

## Broader institutional infrastructure and educational assessment

- A focus on the design and evaluation of all doctoral programs (academic/standard/traditional and professional/industrial) to ensure that they prepare students for professional life both within and outside academia. This is a challenging task, but current changes in the nature of doctoral education need to be acknowledged, as the boundary between academia and industry becomes increasingly blurred. Doctoral learning objectives should encompass abilities beyond the acquisition and production of disciplinary knowledge for academic purposes.
- In addition to objectives in terms of content and skills, doctoral programs should consider how to frame institutional support in terms of collaboration and supervision. Traditional apprenticeships models may be outdated, while partnerships projects, especially in STEM and industrial PhDs, may not provide enough opportunities for creativity and originality.
- Especially with industrial collaborations and industrial PhDs, institutions should establish a clear and ongoing dialogue with the industrial partner about values and expectations, and if possible agree on a set of ground rules about dissemination of research, support of the PhD candidate, and how to maintain effective communication practices between contexts. These collaborations need to be joint ventures. Universities may also wish to consider targeted educational support for this increasing group of PhDs.

## Brokering roles and practices

- Integrate knowledge-brokering activities in doctoral education. Both doctoral graduates transferring to the professional sphere and industrial PhD students are engaged in knowledge brokering activities involving knowledge translation, co-creation, network promotion, and capacity building (Garcia-Morante et al. 2024).
- In terms of research, comprehensive studies are needed to illuminate the complex relationships between academia and industry and how these relationships impact doctoral education for industrial PhD students. While variation is expected, the rise of PhDs that involve knowledge brokering requires an evaluation of their effectiveness both in terms of benefit to the university, societal impact, and for the doctoral students themselves (Compagnucci & Spigarelli, 2024).

## Writing and science communication

- Develop doctoral writing pedagogies that emphasize rhetorical flexibility rather than purely expertise in writing for publication or writing the thesis, and the ability to adapt to distinct communicative situations (Moore & Morton, 2017).

- Develop PhD courses that target a variety of skills (not just theory, method, ethics etc.). The design of these courses should be grounded in evidence. These courses should be delivered as part of a coherent program rather than 'one off' events in the doctoral calendar.
- Embed multimodal and digital components in the communication training of doctoral candidates, possibly across a variety of communicative genres, as these elements are increasingly common both in academic and professional communication.
- Adopt an interdisciplinary approach to fostering knowledge brokering that builds on evidence from research on science communication, doctoral writing, and writing pedagogy, and that draws on the experiential knowledge of professional partners and professional communicators.

These recommendations are encapsulated by the following quote (Moore & Morton, p. 605):

"[W]hat students are in most need of, we would argue, is not instruction in the writing of specific workplace genres (e.g. emails, business reports, etc.), but rather exposure to a range of experiences and tasks that will help them to learn how to 'shape' their acquired disciplinary knowledge in distinctive and communicatively appropriate ways".

# Conclusion

> Doctoral education programs in different countries may require re-examination, and it is the role of universities to lead this re-examination

In conclusion, current research on doctoral education, and specifically professional and industrial doctorates, suggests that doctoral education programs in different countries may require re-examination, and it is the role of universities to lead this re-examination. Universities embody a unique culture that values the search for knowledge, academic freedom, and critical thinking, and as such they should not replace (or be expected to replace) the role of employers in training the future workforce (Cappelli, 2015). As Moore and Morton (2017) point out, tailoring doctoral education to the needs of the marketplace or the workplace risks producing a very narrow approach, far from the ISCED definition of the doctorate as an education that leads to "original research and represents a significant contribution to knowledge in a field of study" (OECD/Eurostat/UNESCO, 2015).

Yet, we must acknowledge that the great majority of PhD graduates will not remain in academia, and even those who will pursue an academic career will need to develop competences that go beyond traditional academic skills. Furthermore, the increased popularity of professional and industrial PhDs requires educational pathways that respond to the experiences and needs of these doctoral researchers: the ability to broker knowledge in various ways across contexts, the development of both academic writing expertise as well as the ability to communicate knowledge beyond the academy, and the need for effective structural support at the institutional level.

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