



UNIVERSITY OF GOTHENBURG
DEPT OF EDUCATION AND SPECIAL EDUCATION

How the Field of Research on Doctoral Education is Organizing itself by means of Conversations in Scientific Publications.

Sverker Lindblad, 4 February 2025

Abstract:

The purpose is to map the international landscape of research on doctoral education in developing researchers, and to understand how this landscape is organised as a research field in nodes and networks working to reproduce/change educational research in different global contexts. We ask: What are important research problems - such as improving research competencies, or counteracting injustices? Which intellectual traditions are working in different contexts? Which nodes and networks are organizing research on doctoral education, who are influential agents and where are they located? What implications have this for international research cooperation and for development of educational research? Answers to such questions are significant for understanding doctoral education and how research communities are responding to challenges in school and society.

1. Objectives or purposes

This paper reports exploratory research used as a 'proof of concept' for a global scale project intending to review issues salient to doctoral education. It demonstrates the value of the methods used to map those issues and alerts researchers to previously unconsidered aspects that will need to be accounted for in the main project.

The purpose is to (a) map the international landscape of research on doctoral education in the development of educational researchers, (b) understand how this field is organising itself in nodes and networks to reproduce/change doctoral education and research, and (c) understand how contributions from this research are emerging out of conversations in these networks. To realize this purpose is significant for understanding different research cultures, for international cooperation, and for globalization, as well as to capture how research communities are responding to changes and problems in school and society. It is also our ambition that this study will function as a resource in the making of international research networking for research on doctoral education.

2. Perspective(s) or theoretical framework

We are interested in the social and intellectual organization (Whitley, 2000) of research on doctoral education, especially in which arguments are put forward in designing and realizing doctoral education programs, which problems are presented, and which interests do they represent (Bacchi, 2000) in different networks, and which intellectual traditions are emerging in doctoral education assemblages (DeLanda, 2016) in different global contexts (Connell, 2010)? In this paper we aspire to combine a broad mapping of doctoral education research and how it is organized (Czarniawska, 2022) in combination with a specific interest in the pursuit of educational research or sciences (Durkheim, 1950; Furlong & Lawn, 2010; Keiner, 2002). Our study is based on previous studies in doctoral education (Apelgren, Lindblad, Wärvik, 2023; Denicolo, Duke, & Reeves, 2019; Hamilton, Wernersson, & Lindblad, 2003; Kemisso Haybano, Haley, Lindblad, S. & Wärvik, 2021).

3. Methods, techniques, or modes of inquiry

The study is a meta-analysis (Luoto et al., 2017) based on a combination of bibliometric analyses (Garfield, 1979) identifying relevant research publications and how these are recognizing each other (or not) in their referencing. Based on this we are analyzing links between publications and how these are organizing the research field in nodes and nets (Latour, 2010) by means of clustering techniques in Vosviewer (Van Eck & Waltmann, 2010), for an example in education, see Lindblad, Samuelsson & Nelhans, 2024).

By analysing such links, we get a picture of the research field we are interested in in two different ways:

- a) *Research fronts* or domains based on biographic couplings between publications by means of their referencing, where similar referencing is indicating similar research interests and problem perceptions and positioning in a research field in contrast to alternative referencing. In turn, this is assumed to correspond to a social structuring of the research field.
- b) *Intellectual traditions* on which the research is based by examining the extent to which cited publications are referred to together – or not. If cited texts are frequently referred together, they are assumed to form an intellectual tradition. And if little of such co-citation is occurring, then this is indicating differences in intellectual traditions

These analyses are based on links between publications, identifying nodes and networks in this research field. In this paper space restrictions preclude closer analysis of discursive meanings in specific texts.

4. Data sources, evidence, objects, or materials

Mapping of the research field is based on resources in the ISI Web of Science (WoS). This makes it possible to (a) analyze numerous scientific publications in depth, and (b) to get data that can be translated into Vosviewer, which makes it

possible to analyze links between publications and by that to identify nets and nodes in the research field. The restrictions of including publications in WoS will be considered when reflecting on results and on alternative data sources.

We identified publications with an interest in doctoral education by searching “doctoral educ” OR “doctoral train*” as a Topic. The overall results were narrowed to the WoS category “Education and Educational Research”. Location of publications were identified by researcher affiliation.

5. Results and/or substantiated conclusions or warrants for arguments/point of view

Given our intent that this study will serve a broader international purpose we present a set of general results on publications first, with few comments. Then we turn to relations between publications showing how the research field is organized in different nodes and nets.

A broad overview of research publishing over time and place:

In WoS we identified 2 098 publications in the topic of doctoral education or training. Of these 952 were categorized as educational research. These publications were transformed as text files of full records plus cited references (n= 7 566) and references citing them (n=13 560).

In figure 1 we present the publications over years. It shows that there were only a few publications per year until 2007 when the research field expanded rapidly.

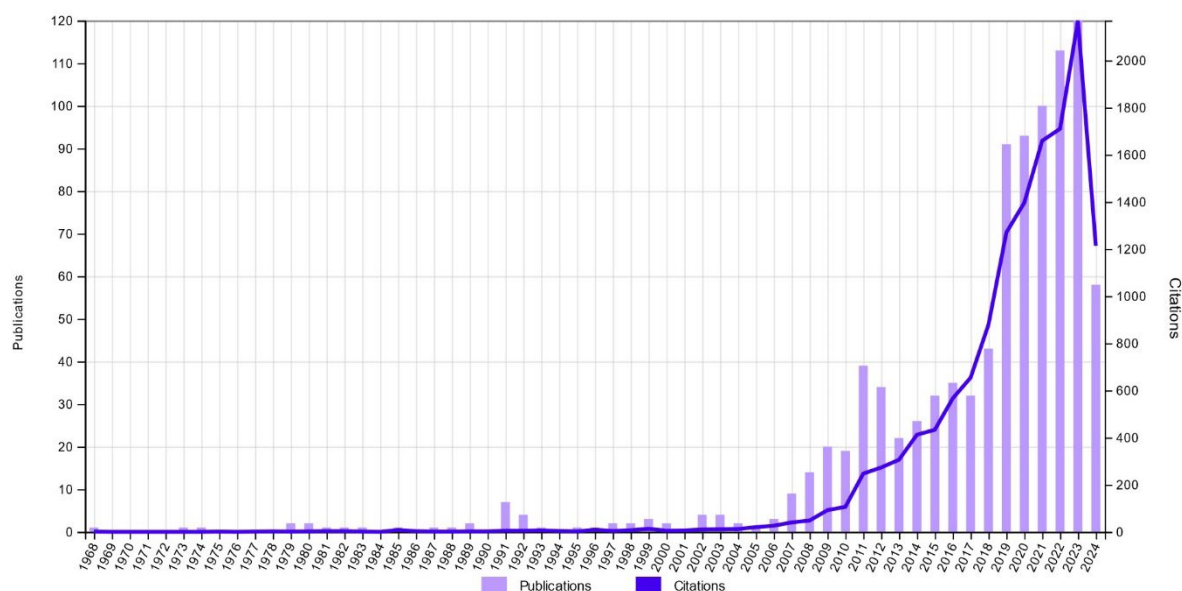


Figure 1: Number of publications on doctoral education research identified in ISI Web of Science over years. (Search Topic “doctoral educ*” or “doctoral train*” in Category Education and Educational Research”

The location of the research published in geopolitical terms is presented in table 1. Here we note the expected Anglo-Saxon dominance. We also note that several countries are entering this field of research, such as the Peoples Republic of China, South

Africa, and Portugal. Further analyses over years suggest that the Anglo-Saxon dominance is diminishing.

Table 1: Publications over countries/regions based on author affiliation. Numbers and percent. (N= 952 out of which the 25 most common affiliations are presented).

Countries/Regions	Record Count	% of 952
USA	324	34.034
AUSTRALIA	147	15.441
ENGLAND	124	13.025
PEOPLES R CHINA	71	7.458
SOUTH AFRICA	55	5.777
CANADA	40	4.202
NEW ZEALAND	39	4.097
FINLAND	31	3.256
SWEDEN	22	2.311
PORTUGAL	21	2.206
NORWAY	18	1.891
JAPAN	17	1.786
SPAIN	17	1.786
SCOTLAND	16	1.681
IRELAND	15	1.576
NETHERLANDS	14	1.471
DENMARK	13	1.366
GERMANY	13	1.366
BELGIUM	11	1.155
FRANCE	10	1.050
TAIWAN	9	0.945
ITALY	8	0.840
RUSSIA	8	0.840
SWITZERLAND	8	0.840
TURKEY	8	0.840

Next, we consider the journals or WoS sources where this research published. In this field of research, we identified contributions in almost 200 journals etc., most of them with an interest in higher education and almost all having English as a publishing language.

Table 1: Publication sources of research on doctoral education. N=192 journals out of which the 25 most used are presented. Numbers and total percent of 952 publications.

Publication Titles	Record Count	Percent of 952
STUDIES IN HIGHER EDUCATION	98	10.294
HIGHER EDUCATION RESEARCH DEVELOPMENT	72	7.563
INNOVATIONS IN EDUCATION AND TEACHING INTERNATIONAL	59	6.197
HIGHER EDUCATION	58	6.092
STUDIES IN GRADUATE AND POSTDOCTORAL EDUCATION	39	4.097
JOURNAL OF SOCIAL WORK EDUCATION	38	3.992
TEACHING IN HIGHER EDUCATION	32	3.361
STUDIES IN CONTINUING EDUCATION	25	2.626
JOURNAL OF HIGHER EDUCATION	19	1.996
EDUCATION SCIENCES	15	1.576
EUROPEAN JOURNAL OF EDUCATION	14	1.471
INTERNATIONAL JOURNAL OF MANAGEMENT EDUCATION	14	1.471
JOURNAL OF FURTHER AND HIGHER EDUCATION	14	1.471
JOURNAL OF DIVERSITY IN HIGHER EDUCATION	13	1.366
QUEST	13	1.366
RESEARCH IN HIGHER EDUCATION	13	1.366
JOURNAL OF TEACHING IN PHYSICAL EDUCATION	12	1.261

FRONTIERS IN EDUCATION	11	1.155
HIGHER EDUCATION QUARTERLY	11	1.155
ASIA PACIFIC EDUCATION REVIEW	10	1.050
PERSPECTIVES IN EDUCATION	9	0.945
CHRISTIAN HIGHER EDUCATION	8	0.840
EDUCATIONAL GERONTOLOGY	8	0.840
HIGHER EDUCATION POLICY	8	0.840
BMC MEDICAL EDUCATION	7	0.735

Sources: Web of Science. Doctoral education research as topic. Published in 192 different journals etc.

Given these broad results, research on doctoral education is expanding and presenting itself in a number of journals. The international picture is changing somewhat with a set of newcomers from different parts of the world. Thus, there is an increasing need to analyze how this field of research is organizing itself.

Nets and nodes:

How is research on doctoral education organizing itself in research fronts and what problems are they working with? The analyses are based on bibliographic couplings to link publications to each other in terms of closeness and distances – the more joint links the closer publications are assumed to be. Based on these links we identified different clusters of publications which are conceived of as research networks in terms of research fronts/domains and intellectual traditions.

Research fronts/domains:

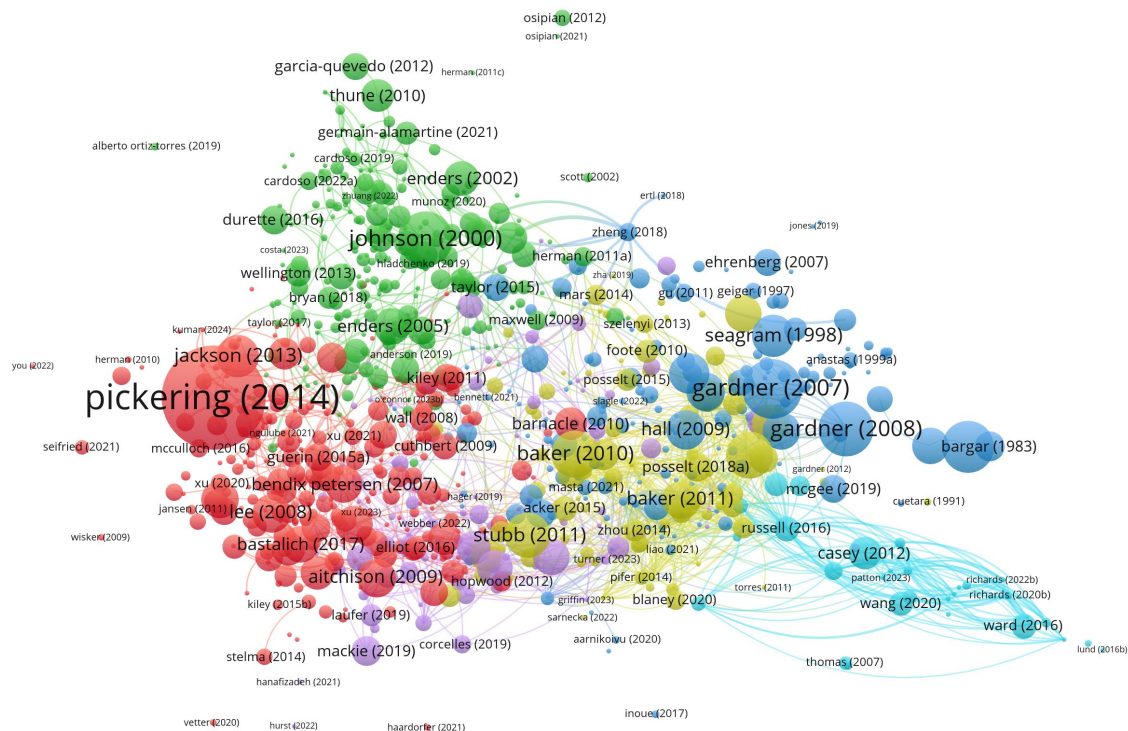


Figure 2: Research fronts in doctoral education research indicated by biographic couplings between publications (N=952). Seven clusters derived by Vosviewer cluster analyses.

Explanations: Colors represent different clusters identified by cluster analyses. Size of nodes is based on number of links. Distances represent number of links between nodes, where closeness indicates large numbers of links and larger distances indicates fewer links.

The different clusters are presented in short in table 3 with number of publications, examples of nodes, and suggestions of themes for the different clusters:

1. Publishing and writing
2. Socialization, mentoring and identity
3. Academy and transition to work
4. Wellbeing and finalization of doctoral studies
5. Physical education and professional work

Table 3: Research fronts in research on doctoral education distributed in seven clusters presented with number of publications, suggested themes and references to central nodes.

Net	Num-ber	Central node	Preliminary Themes
1 Red	297	Pickering, C., & Byrne, J. (2014). The benefits of publishing systematic quantitative literature reviews for PhD candidates and other early-career researchers. <i>Higher Education Research & Development</i> , 33(3), 534-548. Jackson, D. (2013). Completing a PhD by publication: A review of Australian policy and implications for practice. <i>Higher Education Research & Development</i> , 32(3), 355-368.	Publishing and writing
2 Green	237	Gardner, S. K. (2007). "I heard it through the grapevine": Doctoral student socialization in chemistry and history. <i>Higher education</i> , 54, 723-740. Seagram, B. C., Gould, J., & Pyke, S. W. (1998). An investigation of gender and other variables on time to completion of doctoral degrees. <i>Research in higher education</i> , 39(3), 319-335.	Socialization, mentoring and identity
3 Blue	233	Johnson, L., Lee, A., & Green, B. (2000). The PhD and the autonomous self: Gender, rationality and postgraduate pedagogy. <i>Studies in Higher education</i> , 25(2), 135-147. Enders, J. (2005). Border crossings: Research training, knowledge dissemination and the transformation of academic work. <i>Higher education</i> , 49, 119-133.	Academy and transition to work
4 Yellow	107	Baker, V. L., & Pifer, M. J. (2011). The role of relationships in the transition from doctoral student to independent scholar. <i>Studies in Continuing Education</i> , 33(1), 5-17. Mackie, S. A., & Bates, G. W. (2019). Contribution of the doctoral education environment to PhD candidates' mental health problems: A scoping review. <i>Higher Education Research & Development</i> , 38(3), 565-578.	Wellbeing and finalization of doctoral studies
5 Light blue	30	Casey, A., & Fletcher, T. (2012). Trading places: From physical education teachers to teacher educators. <i>Journal of teaching in Physical Education</i> , 31(4), 362-380.	Physical education and professional work

6. Our analyses resulted in a set of five clusters indicating different nodes and nets organizing doctoral education research. These are presented in figure 2.

The themes are derived inductively and are here presented as preliminary labelling of the different networks. As a field the research landscape can be understood in two dimensions:

- A. *From* publishing activities *to* the making of identities based on distances between network 1 and 2.

In the different networks we can identify matters dealing with inequality and inequity in relation matters of gender, racism and cultural difference.

Co-occurrence of keywords:

Another way to understand knowledge interest and problem representation is to analyze co-occurrence of keywords – how they are occurring together is a way to observe how researchers are addressing research problems (cf Callon et al., 1991). We identified 2091 co-occurring keywords that were linked to each other and analyzed. We identified eight clusters that are presented in figure 3.

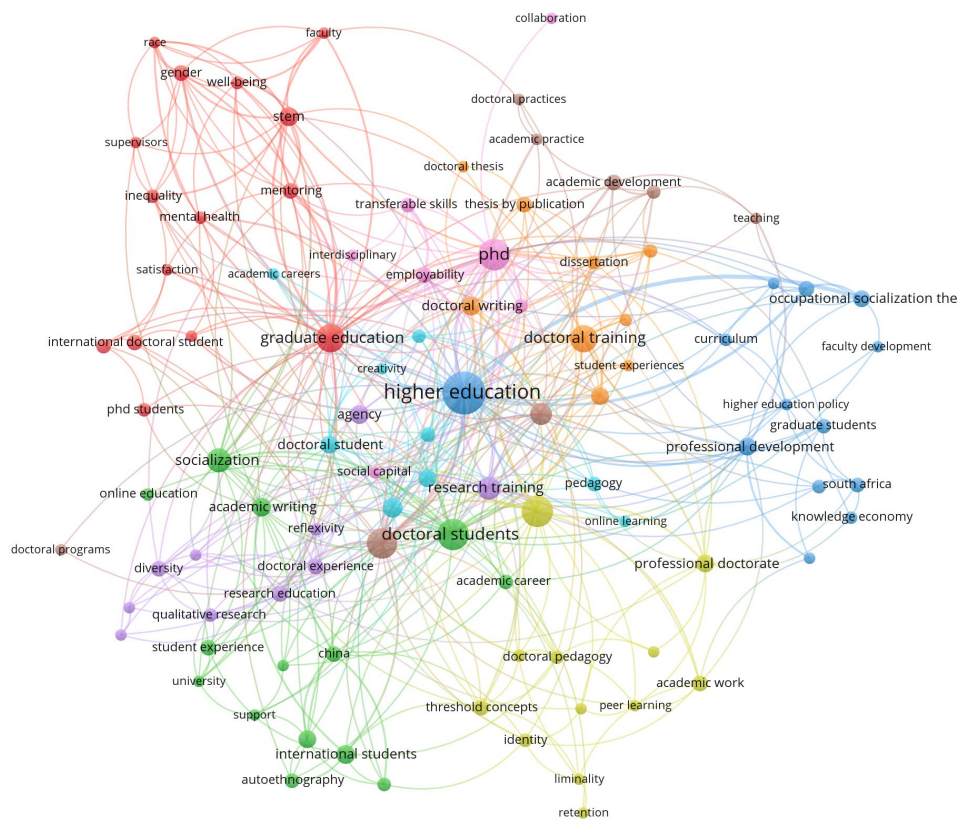


Figure 3: Presentation of keyword co-occurrence in doctoral education research. Total N = 2091 out of which 100 with most links were selected.

Explanations: Colors represent different clusters identified by cluster analyses. Size of keywords is based on number of links. Distances represent number of links between keywords, where closeness indicates large numbers of links and larger distances indicates fewer links

In figure 3 we identified eight clusters representing different interests in research on doctoral education. We note here for instance a primary interest in academic knowledge and professional development in cluster 1, while in cluster 2 we find a set

of keywords referring to matters of gender and race as well as motivation and mental health. In cluster 3 we find matters of academic careers and doctoral programs, with cluster focus on supervision and peer learning. Finally, cluster 8 presents matters of employability and interdisciplinarity. Taken together these co-occurrences point to quite different knowledge interests and problem-representations in research on doctoral education.

Intellectual traditions:

Referencing is a central part of academic writing and publishing as is shown by the large set of cited publications and how they are clustered together. In figure 4 we analyse how the research looks like in terms of co-citation of different authors.

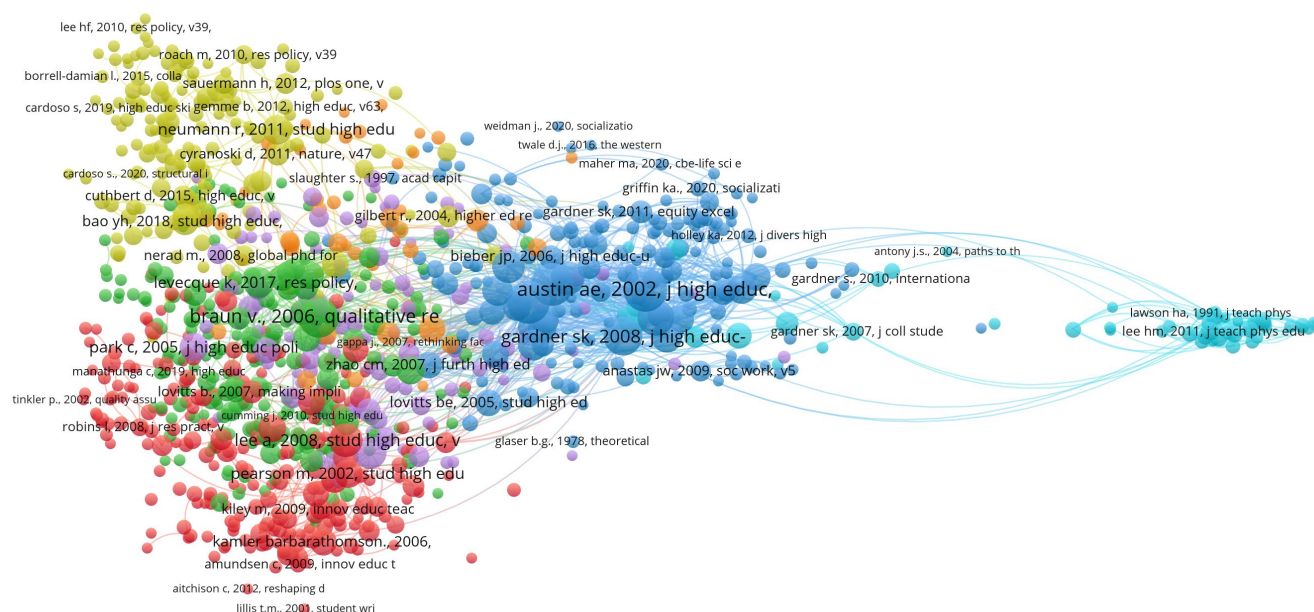


Figure 4: A map of co-citation of publications forming seven intellectual traditions in doctoral education research formed by links in co-citation identified by Vosviewer cluster analyses.

Explanations: Colors represent different clusters identified by cluster analyses. Size of nodes is based on number of links. Distances represent number of links between nodes, where closeness indicates large numbers of links and larger distances indicates fewer links

We identify a set of seven clusters indicating different intellectual traditions. In table 2 we present a selection of publications referred to in different clusters. Of these, the two largest clusters 1 and 2 plus cluster 7 are overlapping when working with matters about emotions and the making of identities, as well as student attrition. In contrast to that grouping, clusters 3, 4, 5 and 6 are rather distinct, dealing with issues considering professional practices and change, matters of knowledge economy, cultural diversity, and physical education. Specific nodes as references in respective clusters are presented in table 4.

Table 4: Clusters of Co-citation of references in research on doctoral education. N=27 520 out of which the 1 000 most cited are selected.

Cluster	Number of publications	Examples of nodes in intellectual tradition
1	227	Braun, V., & Clarke, V. (2006). Qualitative Research in Psychology Using thematic analysis in psychology Using thematic analysis in psychology. <i>Qualitative Research in Psychology</i> , 3(2), 77-101 Hunter, K. H., & Devine, K. (2016). Doctoral students' emotional exhaustion and intentions to leave academia. <i>International Journal of doctoral studies</i> , 11(2), 35-61.
2	214	Austin, A. E. (2002). Preparing the next generation of faculty: Graduate school as socialization to the academic career. <i>The journal of higher education</i> , 73(1), 94-122 Golde, C. M. (2005). The role of the department and discipline in doctoral student attrition: Lessons from four departments. <i>The Journal of Higher Education</i> , 76(6), 669-700. Gardner, S. K. (2010). Contrasting the socialization experiences of doctoral students in high-and low-completing departments: A qualitative analysis of disciplinary contexts at one institution. <i>The Journal of Higher Education</i> , 81(1), 61-81. Lovitts, B. E. (2001). <i>Leaving the ivory tower: The causes and consequences of departure from doctoral study</i> . Rowman & Littlefield.
3	180	Schön, D. A. (1987). Educating the reflective practitioner. Lave, J., & Wenger, E. (1991). <i>Situated learning: Legitimate peripheral participation</i> . Cambridge university press.
4	161	Neumann, R., & Tan, K. K. (2011). From PhD to initial employment: The doctorate in a knowledge economy. <i>Studies in Higher Education</i> , 36(5), 601-614. Kehm, B. M. (2006). Doctoral education in Europe and North America: A comparative analysis. <i>Wenner Gren International Series</i> , 83, 67.
5	121	Vygotsky, L. S., & Cole, M. (1978). <i>Mind in society: Development of higher psychological processes</i> . Harvard university press. Lee, A., Poch, R., Shaw, M., & Williams, R. (2012). <i>Engaging Diversity in Undergraduate Classrooms: A Pedagogy for Developing Intercultural Competence: ASHE Higher Education Report, Volume 38, Number 2</i> . John Wiley & Sons.
6	52	Casey, A., & Fletcher, T. (2012). Trading places: From physical education teachers to teacher educators. <i>Journal of teaching in Physical Education</i> , 31(4), 362-380. Mendoza, P. (2007). Academic capitalism and doctoral student socialization: A case study. <i>The Journal of Higher Education</i> , 78(1), 71-96.
7	44	Gardner, S. K. (2009). Student and faculty attributions of attrition in high and low-completing doctoral programs in the United States. <i>Higher education</i> , 58, 97-112. Bair, C. R., & Haworth, J. G. (2004). Doctoral student attrition and persistence: A meta-synthesis of research. In <i>Higher education: Handbook of theory and research</i> (pp. 481-534). Dordrecht: Springer Netherlands.

7. Conclusions

Through WoS we identified refereed research on doctoral education as a rapidly expanding field of study since the 2000s. It is characterized by Anglo-Saxon dominance in terms of researcher affiliation which seems to weaken somewhat during the 2010s. The language in publications is English. These results also show constraints in using

the WoS resources, which has to be considered in the presented analyses and conclusions.

We have identified a set of problem areas and research fronts in the landscape of doctoral education research such as academic writing and publishing as well as supervision, socialization and research identity, and how to deal with mental health and stress among doctoral students. Analyses of co-occurrence of keywords show that the research field is addressing different societal problems considering for instance race, gender, and social inequalities often combined with advice about how to solve them. This problem-representing (Bacchi, 2000) is an important track for further analyses of research networking.

There are networks dealing with changes and transformations of higher education and research, for instance in terms of governance and marketisation. We identified little of research dealing with reproduction and change of scientific paradigms in reflections on the pursuit of doctoral education. This implies that other mapping strategies must be used in order to capture this paradigmatic aspect (Kuhn, 1960) of doctoral education research.

Our mapping is based on bibliometric analysis of publishing and referencing in the broad landscape of research on doctoral education. We focussed here on how researchers are linking their texts to other texts and how the research field is organising itself by means of such linking practices. Such maps make it possible for us to orient ourselves in this landscape as a research field with its nets and nodes. A next step is to analyse how such referencing is producing research narratives (Czarniawska, 2022) – or not – in specific texts and networks and, by that, getting an improved understanding of how research on doctoral education is emerging as an assemblage in a changing Academy.

8. Scientific or scholarly significance of the study or work

This study presents mappings of research on doctoral education – how it is expanding and organizing itself in nodes and networks by scientific publishing and referencing practices. This meta-analysis complements previous handbooks and research reviews with its focus on how this field of research is organized and which problems are dealt with in different networks, for instance in designing doctoral education and its practices and in matters of social and cultural inequalities. Given this, the study can be used for identifying research contributions and lack of research in different areas as well as a basis for international research cooperation and development.

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