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RESEARCH TRAINING AND CAREER IN TRANSITION: A EUROPEAN PERSPECTIVE ON THE MANY FACES OF THE PhD

WORKSHOP ON USER NEEDS FOR INDICATORS ON CAREERS OF DOCTORATE HOLDERS
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ABSTRACT

Traditional structures and processes as well as norms and believes in the field of research training across Europe are recently challenged by four trends. They encompass the implications of expansion and diversification of the student body in higher education, the changing functioning and role of research in the knowledge economy, the internationalization of the PhD factory, and the growing role of governmental supervision for doctoral training. Altogether, they foster internal diversity within higher education and research as well as external diversity in the contribution made to the economy and the growing variety of careers for those who have gone through doctoral training. The paper reviews these processes and respective responses in public intervention as well as higher education to reorganize doctoral training. It is argued that a diversity of organisational and structural forms as well as different validation criteria and procedures will probably determine the future face of doctoral education across Europe.

Introduction

1. In analyzing the functions and objectives of doctoral training both from its role in the higher education and research system and from the perspectives of its contribution to economy, we might state that certain trends and responses set a common stage across Europe. Obviously, research training in universities that grow at the margins of the undergraduate expansion of higher education is deeply embedded into specific national settings and believes. One of the distinguishing features of Europe, in this field as in many others, is the different models of doctorates and doctoral training which exist in the various countries. Nevertheless, certain common trends as well as tensions can be identified in observing and integrating a certain portion of these country accounts. The following makes an attempt, first, to elaborate four broad trends that set the stage for doctoral training in transition across Europe, namely addressing the implication of expansion and diversification of the student body in higher education, the changing functioning and role of research in the knowledge economy, the internationalization of the PhD factory, and the growing role of governmental supervision for doctoral training. Second, recent policies towards a re-structuration of doctoral training with their different facets and tensions are discussed. These developments are not only setting a rethinking of traditional practices in doctoral training on the agenda but challenge deeply embedded traditional notions of the advanced research training system.

Common Trends

2. Across Europe, doctoral training and the further careers of doctoral degree holders have recently become for the first time issues of explicit concern and reconsideration. Developments in this area reflect a complex picture of changes in the higher education and research systems, and their relationship, both, to economy and society.

Massification and diversification of the student population

3. One well-known trend concerns the rising tide of access and participation in higher education. In the 1950s, in many European higher education systems 5 percent or less of the age group had access to higher education. In the meantime, although with different speed and timing, more or less all higher education systems serve 25 percent or more of the age group. Thus, European higher education has passed the critical demarcation line between elite and mass higher education that Martin Trow once laid out. And repercussions for the system of advanced research training are manifold. They certainly concern the quantitative growth of doctoral training that follows the expansion of first degree numbers. In the 1990s, growth has been remarkable across Europe. Some countries, like Finland, Italy or Portugal, made explicit attempts to strengthen their home-made PhD-output that doubled in just one decade. In the same period PhD production in the United Kingdom doubled as well. In other countries, like France and Germany, output in terms of PhD-numbers increased by, at least, 30 percent just following the expansion of undergraduate education. In absolute numbers Germany is the biggest producer of PhD with currently about 25.000 PhDs per year followed by the United Kingdom with about 14.000 and France with about 11.000 PhDs per year. Altogether, the proportions of PhD holders are higher than in the USA or Japan (European Commission, 2003).

4. With the growing student body becoming more heterogeneous in terms of social background and age, levels of preparation and work experience, patterns of studying and learning than in the past, the need for introductory teaching and diversifying learning pathways is expanded and intensified. Old ideals about a rather individualized and personal relationship between professors and students in a research-teaching-environment diminish while more formalized arrangements for a growing and diversifying student body become more apparent, not only on the introductory level but on the more advanced levels towards research training. While access into higher education becomes less selective, more diversification sinks into the system to safeguard the selection and screening function of higher education. Differentiation in

terms of types and qualities of higher education institutions, in terms of degree levels and degree programs multiply the possible pipelines and stages of selection within the higher education system between the entrance point and the training for the highest degrees.

Demand for advanced education on changing labor markets

5. In the course of expansion of higher education a lot of concern was and is about a quantitative match or mismatch between higher education and the labor market as well. Public debates and scholarly reflections in this area started in the 1960s with high hopes for more equal opportunities and economic prosperity by investment in education and training. The expansion of universities occurred as part of a larger societal development that was accompanied by a flourishing public sector. Its expansionist logic proceeded on a dual track, offering new educational opportunities as well as new employment opportunities in education, health and welfare in a kind of self-vindicating system (Nowotny, 1995). The 1970s faced "the end of the dream of everlasting prosperity" (Lutz, 1984). The pessimistic view spread that expansion of higher education had gone too far and that graduates' skills no longer matched the needs of the employment system. The debate was marked by sharp disagreements over a presumed over-education or under-employment of the many more graduates for whom not sufficient or not sufficiently well qualified jobs would be available (Psacharopoulus, 1987). In the 1980s expectations and empirical findings adjusted to a somewhat blurred state of affairs which neither supported the high hopes of the 1960s nor reinforced the deep sense of crises of the 1970s (Teichler, 1998). Since the 1990s a new process of adjustment and re-structuration is under way that tends to undermine the whole notion of a quantitative match (De Weert, 1999). The perils are no longer seen in diminishing return of investment due to growing competition or in the labour markets' being swamped by overqualified and dissatisfied applicants. It is nowadays more frequently underlined that it is the occupational structure and stratification system itself that has become mobile. The characteristics of occupations and jobs, the vertical as well as the horizontal division of work, the needs and reward structures of the employment system continue to be restructured. Quality thus stands for possessing a mixture of skills and knowledge for new and changing configurations. Graduates are expected to be trained for what is increasingly seen to become a market for 'knowledge workers' in constant flux.

6. Within this overall context, information and insight into career trajectories of PhD holders is still limited across Europe. Some large scale surveys reveal that although many PhD holders are employed in the higher education and research sector, a surprisingly high proportion finds further employment in other sectors and occupations. As regards the further employment and work of PhD holders differences between the Europe and the US seem to be lower than usually expected. Survey results among a cohort of Dutch PhDs (Hulshof et al., 1996) show, for example, that 38% of them were working in higher education, 15% in public research institutes and another 13% in research-related functions in industry while 26% were in non-research related employment. French data show a rate of further employment in the higher education sector of 49%, and first destination surveys in the UK report that somewhat more than 40% of PhD holders work in higher education (HESA, 1998). From the US an employment rate in the higher education sector of 47% is reported (Fechter & Gaddy, 1998). Early destination studies may, however, overestimate the proportion of PhD holders employed in the higher education sector due to later fluctuation and net outflow on the career path. Enders and Bornmann (2001) show, for example, that employment of German PhD-holders in higher education declines by about 10% during the later career trajectory and that the employment rate in higher education ten years after the PhD is between 21% (business studies) and 37% (mathematics). Over time the sectoral composition has shifted as public and non-profit employers as well as industry have employed proportionally more and academe less PhD holders. Data from the US reveal, for example, a decrease in employment in academe of about 10% from the early 1970s to the early 1990s (Stephan, 1996). Data from Germany comparing cohorts from the early 1980s and 1990s show a more moderate change in the respective employment sectors of PhD holders in the same direction (Enders & Bornmann, 2001).

7. In terms of added-value and return-to-investment of having a PhD for employment and career outside higher education and research, most available analyses tend to show little or no advantage of PhD holders. Employment conditions regarding salaries or job security seem to be comparable with first degree graduates or turn out to be somewhat negative for doctoral degree holders in a number of countries, like France, the Netherlands or the United Kingdom. The striking counter-example for an added-value of the PhD on the labor market outside higher education and research is Germany (Enders, 2002) due to the important function of the PhD for the recruitment and self-reproduction of the professions and elites in public administration, politics and law as well as in industry.

The role of research for the knowledge economy

8. Postgraduate and postdoctoral research training are more and more influenced by the debate about the extent to which higher education and science experience a change in their mode of knowledge production as well. In this context emphasis is on the growing importance of "problem solving" approaches linked to the greater dissemination of knowledge capabilities throughout the economy and society. Looking at higher education's research function and keeping in mind that basic research is a key to innovation, the importance of knowledge and human capital for innovation and competitiveness are more and more stressed. Universities and colleges could become potential partners for knowledge intensive firms, especially in a situation in which public subsidies (national/international) for the core university activities are declining and subsidies for innovation and research are rising. Public-private partnerships, networks and alliances are already being established. This move to more network-like research and innovation structures is a manifestation of the increased blurring of boundaries between traditional spheres of government, industry, academe – with the emergence of 'triple helix'-like constructions and partnerships (Etzkowitz & Leydesdorff, 1998).

9. The traditional mode of knowledge production is gradually being complemented by a mode in which research problems are identified and solved in the context of application. This means that problems are not mainly tackled from a mono-disciplinary academic perspective, but they are approached by a wider set of stakeholders. This new mode of knowledge production (called 'Mode 2', to distinguish it from the traditional, 'Mode 1' approach, see Gibbons et al., 1994) requires therefore a trans-disciplinary approach, characterised by interaction between users, producers and brokers of knowledge. The users of knowledge may be located on the different territories in which the university is active: local, regional, national, international.

10. Indeed, it is believed that many innovations and new technologies of high potential will be characterised by the confluence of a number of component technologies and disciplines. This implies that the organisational structure of the university should not discourage the creation of such multi-disciplinary research teams. It may even require a kind of transformation towards a so-called network organisation. In any case, the traditional disciplinary pillars (departments, faculties) will continue to exist, but temporary (transient) and 'heterarchical' organisational forms will have to be formed.

11. In light of this, universities will have to rethink their strategy and their structure in response to the environmental changes. Ultimately one may describe this as a transformation of the university from a traditional supply-driven institution to a networked, demand-driven institution. For societies and higher education providers to capitalise on the benefits that knowledge may bring, stronger connections between the producers of knowledge and the users of their research—both internationally and domestically may be necessary. This will involve greater participation of users in determining priorities for funding and performing research and greater movement of researchers across the various research settings in universities as well as businesses. The linkages may also extent to the provision of research training, where students will learn skills in both academic and industrial environments. The erosion of boundaries and the permeability between the university-based research system and other societal sectors cast doubt on the

claim of the conventional doctorate by thesis as being the only or best way to train researchers for the knowledge economy untouched. Changing incentives for problem choice, the mix of research, attitudes and responses to public-private partnerships and spill-over, will affect the rules and rewards that govern the academic commons.

The internationalization of the PhD-factory

12. The international dimension of research training, career and mobility is becoming more important. The European policy towards a European Research Area, motivated by a concern about the declining investment in scientific research, stresses the need for more research cooperation and 'more abundant and more human resources' (European Commission, 2000). European policy encourages to make more use, both at national and at European level, of mobility as an instrument for the transfer and spreading of scientific knowledge and to foster a European dimension into scientific careers. This includes the enhancement of the career prospects for researchers from other European countries, and more generally bringing together the scientific communities and companies all over Europe. Moreover, the introduction of educational sequences in a Bachelor- and Master-structure raise questions on the place, structure and funding of doctoral training in the process of Europeanization. While European policy in the area of research training and research careers is actively supporting the internationalization of the PhD, another development has provided an even more important push towards international recruitment and mobility.

13. In a number of fields in the sciences as well as in engineering and technology, Europe in general is slipping rather than gaining on the supply side of undergraduate training. In several countries, interest among the young generation of graduates for these fields that are supposed to be of critical importance for research-based innovation capacities has declined. Given the overall increase in PhD output, there is not so much an overall shortage in terms of PhD production but a problem in terms of choice in terms of fields of study across Europe. Factors helping to explain this are, at least, threefold. Economic perspectives tend to emphasis the function of PhD training as an educational investment and look for problems in return-to-investment to understand the gap. Other perspectives extent the list of possible impact factors to socio-cultural perspectives such, as 'youth culture' and the public appeal of science, the gender image of certain science and engineering fields; and to the educational structures themselves, such as the perceived inflexibility and difficulty of science and technology studies (Kaiser, 2000).

14. In times and fields where interest for research training on the national turf is declining recruitment of international students becomes more important. This phenomena is well known from the US system that is for decades relying on international import for the sustainability of its input and output in research training. And the European response resembles the experience across the Atlantic: universities increasingly cater on international markets, especially in Eastern Europe and Asia. International markets for research training and global competition for the bright minds are thus expanding and challenge the idea of a more or less entire national system of self-reproduction across Europe.

Governmental concern and supervision

15. Until the two last decades, doctoral training was rarely an explicit concern of policy-makers or university leaders across Europe. Doctoral training tended to be regarded as the more or less unplanned outcome of a composite mix of higher education policy and science policy. Overall research support for universities as well as special research and science programs initiated by the state and/or the science organization were mainly thought of as instruments for general research support and control neglecting their direct or indirect impact on junior researchers training and career. Everything else was more or less seen as an internal affair lying in the responsibility of the disciplines and the individual professors. Recent attempts to initiate explicit policies for doctoral training show that the scenery has changed for a number of reasons.

16. Certain policies are enacted to re-structure the training-career trajectory in direct response to the perceived shortcoming of the 'apprenticeship model' of junior training and career. In this context criticism was, and to some extent still is, on the particularistic nature of recruitment on the local turf and the lack of a national and international market for doctoral training, the lack of structure in an individualized junior-senior-relationship, the 'learning by doing' approach of doctoral candidates preparing themselves under more or less helpful academic supervision, the lack of breadth in research training, and the considerable time-to-degree and the ageing of the doctorate.

17. More prominently, however, are other concerns not directly related to doctoral training but to the research function of universities in general, namely the concern to limit costs and to concentrate research (Clark, 1993). One way to induce change in the way academic research is organized and funded across the higher education sector and other national research institutions concerns the funding mechanisms. Performance-based block funding, separation of funding for research and teaching, concentration of resources for 'centers of excellence' or targeted programs, growing competition for resources in review based systems are examples. Higher education and research policies increasingly emphasize a greater diversity within the national and European landscape of higher education. Horizontal differentiation is supposed to create greater diversity in the division of work between sub-sectors and organizations within the system, example given in terms of the mix or separation of teaching and research, fields of study and research, orientation towards the international, national or regional market. Vertical differentiation is supposed to create greater diversity or to make diversity more visible in terms of quality and reputation of sub-sectors and organizations, last but not least, in order to identify the 'centers of excellence' across Europe that will serve as the main places for research training as well.

Policies and tensions

18. The graduate school movement across Europe that originates from respective reform attempts in the 1980s and 1990s forms part and parcel of these developments in setting up more coherent and systematic structures. Organized training in research schools, graduate schools or doctoral schools is developing in many European countries, especially in the Nordic countries, in France, the Netherlands, the UK, and on a more experimental basis in other countries such as Germany and Spain. This model of doctoral training incorporates a sequence of prescribed courses as one of its main features. Along with this phenomena, doctoral training becomes organizationally structured and covers a critical mass of PhD-candidates as well as supervisors. Frequently, it is used to stimulate inter-disciplinary cooperation as well. These developments in different European countries show how the doctorate has evolved from a rather loose concept characterized by individual master/apprentice relationships towards more structured forms of postgraduate education. At the same time other structured doctoral programs have emerged which provide doctoral education, sometimes solely internally within the university, but also through alliances with various public and private organizations. This proliferation, 'bundling and unbundling' in terms of content and location was to some extent inspired by a European perspective on the US experience of doctoral training. But fruitful misunderstanding has contributed to the creation of new forms that actually inspire in turn to some extent reform initiatives in the US. 'Learning from the US' has at the same time stimulated a further emphases on postdoctoral training and employment (Blume, 1995) and a reconsideration of further junior staff careers in universities. These developments incorporate more and more incentives for interdisciplinary and international cooperation in the training-career trajectory as well.

19. Furthermore, the broader employability of doctoral degree holders beyond the academic labor market has become a topical issue. It has been argued that the traditional PhD training is meant to prepare exclusively for an academic career. This is true in the sense that academe lived, and to some extent still lives, under the 'one size fits all' assumption: what is good for the preparation for a career in higher education and research is good for other careers as well. In the meantime, believe is widespread that research training has to anticipate to a growing extent the needs of the labor market outside academe and

needs to be decoupled from its strong association with the academic labor market. But what does that mean? A quest for more explicit training in soft skills, project management and teamwork has been emphasized in respective policies and, to some extent, in practice. Incentives to organize PhD training as a journey through different research environments and organizations might be more useful in this context – among other things because such an early socialization into the tacit knowledge of different research environments helps to bridge the existing gaps and to anticipate careers in multiple institutional settings. The growing emphasis on transferable skills and employability should, however, not neglect the fact that postdoctoral training is also oriented towards the internal academic labor market. Interestingly enough, policies that intend to 'dislocate' the training-career-trajectory relatively seldom address the need and consequences to re-think the knowledge and skill base for further careers in higher education. Thus, a proper balance is needed between the different purposes of the PhD as a multi-vocational training for a growing diversity of career trajectories. Moreover, responses from the labor market are less than clear. There are at least two working hypotheses relevant to research training differentiation and pre-career preparation. One emphasises the importance of student and learning differentiation because the value of the credentials offered declines as they become substituted by recurrent qualification and assessments all along the further working career. The alternative hypotheses is that, unless new modules and credentials are established that are congenial for a flexible workforce over the life span, the need for aggregate and simplified assessment of competencies on the labor market will undermine any successful step toward realising learning pathways (Tuijman, 1999).

20. Policies in the field of research training contribute to the ongoing breakdown of boundaries between academe and the fields of practice as well as between long established disciplinary boundaries. Normative divides are becoming blurred while new networks of practice sink into the culture and organization of universities and their basic units. Much attention is given to the question to what extent sufficient quality can be guaranteed given the fact that a further proliferation will continue and that there are different images, different ideas about what research training is, or should be. To what extent can non-academic evaluative criteria be applied, particularly when research takes place in the context of application and is the product of teamwork? At the same time it is put forward that also the research schools as such are not a sufficient guarantee for optimal quality, as experiences from the US system of doctoral education show. Also in Europe there is criticism that several schools have not yet defined the objectives of the PhD-curriculum in a sufficiently straightforward way. Given these criticisms and different images of the PhD, the standpoint that the award of doctorates should remain the privilege of the university is up-to-now not contested. Consequently, universities bear all the responsibility for the quality of the PhD's including the establishment of adequate supervision. The growing attempts to strengthen the process-related evaluation of the quality of work have, however, to face the fact that there is an overall lack of criteria to assess research as a work in progress and not only as an 'output'.

21. The main dilemma with all this is how to be simultaneously standardized and pluralized, large and small, formal and informal. And there is now easy way out. Pluralism of approaches enables adaptation and competition to put in place a selection process which hopefully helps to sort out best practices in doctoral training, while standardization helps the labor market to discern what is what in terms of credentials and qualifications. In a standardized system a PhD has a similar meaning to the labor market but we can also see stagnation and a lack of responsiveness to change. International competition between systems and institutional competition within systems set the stage for growth and concentration of financial and human resources. Attempts to create formalized and unified models for doctoral training can, however, not neglect the co-existence of multiple small worlds of research training with their specific practices of research and research training.

Conclusions

22. Traditional structures and processes as well as norms and believes in the field of research training across Europe are recently challenged by four trends. They encompass the implications of expansion and diversification of the student body in higher education, the changing functioning and role of research in the knowledge economy, the internationalization of the PhD factory, and the growing role of governmental supervision for doctoral training. Altogether, they foster internal diversity within higher education and research as well as external diversity in the contribution made to the economy and the growing variety of careers for those who have gone through doctoral training.

23. Various policies have been established to respond to these trends that challenge traditional notions of doctoral training across Europe. These policies reflect the move from the Humboldtian apprenticeship model of doctoral training, in which 'infection' by science and discovery is supposed to serve a broad variety of careers, to the realities of mass higher education, changing labor markets and the knowledge economy. From the governmental point of view, the new organization of research training aims mainly at a more efficient production of PhDs, a concentration of scarce resources, and the stimulation of innovative responsiveness to the needs of economy and labor markets. At the same time, developments within the house of science reinforce ongoing changes in the structures and processes of research training. Research training and careers have traditionally played a major role in reflecting and stimulating a certain science regime that links individuals and institutions as well as social structures and knowledge production (Gläser, 2001). There is little reason to believe that this basic pattern is likely to change. But there are indications that a certain academic-disciplinary mode of knowledge production that has dominated our view on 'cognitive careers' and 'professional careers' in research is loosing ground.

24. These developments are not without dilemmas, and the old and new structures for research and research training are held together in a state of tension. Given the various aims, functions and views of the doctorate it is premature to assume that one role model that is exemplary for all situational and all disciplinary and trans-disciplinary contexts would be appropriate. A diversity of organisational and structural forms as well as different validation criteria and procedures will probably determine the future face of doctoral education across Europe. Some would argue that this diversity can be achieved within the traditional PhD structures being sufficiently robust to encompass this. Others take the view that new structures and role models are needed arguing tentatively that a new mode of knowledge production necessarily replaces the old school model of the doctorate. It would, however, be a misunderstanding to assume that a further diversification will bring about a breakdown of traditional concepts of scholarly work and training. More likely, new approaches are emerging that are partly vested within and partly next to the prevailing doctoral training context.

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