

Ready or not: different views about transferable skills of doctoral candidates in Flanders

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Abstract

There are still barriers that impede a fluent transition from the academic to the business sector for doctorate holders. The lack of necessary skills is one such barrier. The question remains if academia can deliver a workforce with suitable competences for non-academic sectors. This article explores both the opinion about the importance of transferable skills on the part of doctoral candidates as well as the attitudes of companies towards doctorate holders. Is there a mismatch between what doctoral students consider important skills and what employers expect of researchers? If so, can this mismatch in views about competences be reduced by bringing doctoral candidates into contact with other sectors earlier in their career, e.g. by means of collaborative doctoral programmes? To answer these questions we draw on several sources of data. The Survey of Junior Researchers (SJR) represents the view of the doctoral candidates, and its results are compared with both those from the Research & Development Survey of Flemish companies and those from qualitative research in industry, representing the employers' view. A clear mismatch between what doctoral candidates consider important skills to get a job in the business sector, and what employers expect from their researchers is observed. Except in a few disciplines, doctoral candidates still feel that their doctorate is of little added value outside academia. Universities and industry share a responsibility in bridging this gap, through increasing intersectoral collaboration, raising awareness among doctoral candidates and providing better career training. This, however, touches upon another crucial question: can it be expected from a university to provide a totally demand-driven workforce for other sectors at the level of advanced researchers?

Keywords: transferable skills, intersectoral mobility, intersectoral collaboration, employability

1. INTRODUCTION

Although European doctorate holders look for their careers more and more outside academia, the question remains whether they are adequately prepared to make the transition from academia to other sectors, and to the industrial sector in particular [1;2]. As the number of early stage researchers hoping to establish academic careers by far exceeds real academic career opportunities, not only in Flanders [3], but also in the rest of Europe [4], and there is a strong demand for such a highly skilled workforce in other sectors (e.g. industry) [5], such transition should be natural. Unfortunately this is not as straightforward as it seems. Too often doctoral candidates focus exclusively on the academic sectors, while considering other sectors merely as second choices [6]. To make things worse, there are cultural differences between the academic and non-academic world and many employers have stereotypical views of doctorate holders [7]. The lack of the right skills perhaps forms one of the main barriers. Doctorate holders themselves are often unaware of what skills they have to offer or are unable to sell them beyond academia [8;9]. A lot of the debate is based on the specific skills they may or may not have or that they may or may not need. That there is a mismatch between the skills acquired in academia is not new [4;10]. In the past recommendations have been made to remedy the situation [2;11], but little has changed since.

In this paper, the focus lies on the transition to the business sector, because this innovative sector employs a large number of doctorate holders and researchers [12]. In Flanders most of the doctorate holders that leave university, are employed in (chemical & pharmaceutical) industry (13%), (non-university) education (13%), health care & social services (12%), government(11%) and ICT (8%) [13].

In order to meet the goals set out by the Lisbon Declaration [14], these sectors need a highly skilled workforce. Employers have a long wish list of what they search in researchers and up till now they are not successful enough in getting these qualifications on the agenda of Higher Education Institutions (HEI's). Most of the literature about employer demands of higher education is situated on the level of graduate master students [10;15]. Specific transferable skills searched for in graduates tend to be the same as the ones doctorate holders should have. But then where lies the added value of doctorate holders?

Vitae [16] reports about the competences (post)graduate students have. While it is expected of graduates (undergraduates and masterlevel) to be able to deal with complex issues, to show responsibility and initiative; doctorate holders should have the following qualities as well: independence, problem solving skills, top research skills & techniques, creativity, creating knowledge... Depending on the courses they have taken, their experiences and research field, they may work well in teams, show leadership and analytical qualities, know how to network & communicate... Especially the latter skills (e.g. teamwork) are important in an industrial work environment [1]. Around the time Roberts [2] set out his recommendations, doctoral training started to pay more attention to the development of transferable skills [5;14] but there's still a lot of work to be done. In Flanders, Doctoral schools have set up training programmes to deepen and broaden the knowledge and skills of doctoral students. One of the aims of the Doctoral Schools is to improve the skills necessary for a career outside university. In a survey that was held among junior researchers at Ghent University [17], transferable skills training and acquiring experiences for a non-academic career were seen as an added value of the Doctoral Schools by three quarters of the respondents. However, few doctoral candidates actually did take up these courses on transferable skills (intellectual property, business skills, personal effectiveness, career training). It must be noted though that these courses are relatively new, and might therefore be less known among the students. Nevertheless, teaching such skills is not enough when doctoral candidates are not convinced of, or aware of the need to acquire them.

In most cases, doctoral candidates have no contacts with other sectors during their doctoral research and therefore do not know what other sectors expect of them. They also complain about finding the right information to make the step when they are ready for the job market [5]. Collaborative doctoral experience is mentioned in this discussion, as should it help the doctoral candidates in gaining an understanding of the business world and acquire some of the skills required in industry and thus ultimately broaden their employability outside academia [18]. D'Este & Patel [19] also highlight the importance of interaction with industry during doctoral project to build up the necessary skills for career prospects outside academia.

The present paper briefly explores whether, in Flanders, the competences that employers consider important for researchers correspond with those doctoral candidates consider important. If not, it will be investigated if the mismatch can be solved by bringing doctoral candidates into contact with other sectors early on in their career, for instance, through collaborative doctoral programmes.

2. RESEARCH DESIGN

2.1 Quantitative research

The *Survey of Junior Researchers (SJR)*, collected in universities of Ghent, Brussels, Antwerp and Hasselt (SOOI-UGent, 2008), captures the view of doctoral candidates. This online survey was carried out in the spring of 2008 in Ghent University as a pilot-survey; the surveys in the other universities were carried out towards the end of 2008. Using the staff databases of the different universities, the survey was sent to 5976 junior researchers, who were defined as non-doctorate holding research staff. Overall, 2599 junior researchers (partially) completed the websurvey, which makes for a response rate of 43.5%. The effective size of the sample used in the analyses presented here was 1994 junior

researchers^[1]. The SJR contained questions about the doctoral research of the junior researchers, the support of their supervisor(s), intersectoral collaboration, work satisfaction, international mobility and career plans. Key questions for this article are those about the sector they prefer to work in after obtaining their doctorate: they were asked to rank the various sectors from most preferred to least preferred sector of employment. In this paper the focus lies on the comparison of respondents who want to work in a business sector after obtaining their doctorate with those who are more interested in a job in the academic sector. The business sector here includes industry, service- and primary sector. We are well aware of the differences between these sectors, but to maximize the comparability with the sectors of employers in the R&D Survey, they are grouped together in these analyses. Primary analysis showed no big differences in perceptions of doctoral candidates who prefer one of these sectors. Respondents who preferred academia and ranked this sector first, second or third and did not rank business first, second or third, make up the academia-oriented group. Almost half of the respondents (N=795) fall in this group. A similar logic was used for respondents who are more business-oriented, which was the case for 265 respondents. Most of them are industry- or service-oriented. Not all of the respondents could be attributed to one of these groups. Also, variables are used of the section about collaboration with other sectors: the sector they worked with the most and perceived consequences of this collaboration. In the section about career plans, the respondents were asked to pick 7 items out of a list of 27 skills/competencies and rank these according to importance. They were asked to pick the skills that they most valued for their further career.

An identical list of 27 skills/competencies was given to the employers, who completed the *Research & Development Survey* carried out by our colleagues at Leuven [20] in the spring of 2008. These 2597 Flemish companies, of which there were strong indications that they were doing R&D, or had their own R&D department, were asked about their personnel, structure of the company, R&D activities and initiatives, innovation and collaboration with others. 1164 (or 45%) companies (partly) completed this survey. 493 respondents answered the question about the skills they look for in a researcher, of which they had to rank the 7 most important ones^[2]. Since not all of the companies employed doctorate holders, therefore the skills were linked to the composition of the R&D staff and the employers were divided up in those that already employed doctorate holders and the ones who didn't. A number of control variables were also included here: sector, size of company, cooperation with university.

2.2 Qualitative research

Some extracts from qualitative research within the Flemish industry sector will be used to further illustrate some of the main findings from the surveys. Interviews were conducted in eight Flemish companies, all within the technological and chemical/pharmaceutical sectors, both SMEs and multinationals. In total, 24 interviews were carried out: 8 employers (E) and 16 employees/researchers (R) who were working in or are related to the R&D department of the company. The quotes provided in this article were translated from Dutch.

3. RESULTS: MAIN FINDINGS

The comparison of the perceived importance of skills among doctoral candidates and employers is shown in Table 1. Both groups are further split into two groups: academia-oriented respondents and business-oriented respondents, and employers who work with doctorate holders and those who do not. The perception among doctoral candidates of the skills that are important for their further career depends on the sector where they want to work in the future. Most of the respondents clearly aspire a further academic career: for 50% it's their first choice, and around 80% mentioned the university in their top three. About half of them acknowledge that the possibility to stay at the university after obtaining a doctorate is limited. The ones who prefer to work in the business sector, however, are quite confident that this will not generate any problems: on average 87% think there's a high probability to get a job in these sectors. Yet, they don't think their doctorate will help them that much: only 35% thinks it is rather a surplus value in these sectors. Apparently they believe that other qualities will help

them succeed. The results in Table 1 show how well their views really match those of the employers in business, at least regarding transferable skills.

Academia-oriented respondents give a higher value to the pure 'academic' skills such as scientific knowledge, research skills, independence, presentation-, teaching- and writing skills, while business-oriented respondents value more the practical & social skills: teamwork, project management, leadership qualities and business skills. As shown in Table 1, both groups agree on the most important skills. Social skills, scientific knowledge, analytical thinking and research skills are in the top 5 of both of the groups. Teamwork is higher ranked by business-oriented respondents and is thus mentioned a lot more by this group (42% vs. 29% for academia-oriented respondents), whereas teaching skills are not so important for this group (14% vs. 36%). There are also large differences between the fields of science (not included in Table 1). Only doctoral candidates of applied science render a quite high value to technical skills (31,3% and ranked as 8th item). There was no significant difference for this skill between university and business-oriented respondents, while this is one of the most important ones in the view of employers. Although we should be careful in comparing the percentages of the two datasets ^[2], we must highlight the difference in technical skills: almost three quarters of the employers mention this skill, whereas only 16% of the doctoral candidates consider it as important. Out of the data of the R&D survey, the top 5 skills needed for researchers, stated by employers are: technical skills, analytical skills, teamwork, research skills and taking initiative. Three out of five of these skills are also in the top 5 of doctoral candidates, but the most important one, technical skills, is not. This one is not even stated in the top ten, only 16th. The following extract underlines the importance of technical skills in industry:

“Technical skills are most important when recruiting doctorate holders. We carefully sort out the ones who want to do fundamental research and the ones who want to do applied research. If you're not sufficiently technically skilled, you cannot get through the selection procedures.” (E)

However, there are clear gender differences here. Among the business-oriented respondents, women value important business skills a lot less than men: technical skills (11% vs. 24%, $p < 0.001$), analytical skills (38% vs. 47%, $p < 0.001$), project management (16% vs. 21%, $p < 0.010$). Although there is a large percentage of women who would prefer to work in one of the business sectors in the future, their understanding of the skills needed is quite alarming. Apart from that, there is a gap between the ranking of business skills of doctoral candidates and employers. Few students (on average 3%) mention this as an important skill, and even among the business-oriented respondents only 9% mention it.

Yet, there are also clear differences between employers who employ doctorate holders and those who do not, regarding the skills they look for in a researcher. Although the top five most stated skills are all but one (i.e. analytical thinking) the same, there are clear differences in ranking and percentages. Technical skills (77% vs. 65%) & business skills (51% vs. 41%) are more valued by employers who don't employ doctorate holders. Research skills (75% vs. 56%) and scientific knowledge (69% vs. 54%) are valued much higher amongst employers who do work with doctorate holders, as is the ability to learn new things (43% vs. 33%). Thus, employing doctorate holders seems to change somewhat the perceptions of employers of what they look for in a researcher. Also, differences are found between the size of the company and the subsector. In large companies there's more emphasis on working in team and on project management, whereas in smaller companies independence and technical skills are of greater importance (not in table). Independence is also of greater value in the service sector than in the primary sector and technological skills in ICT /primary sector than in other subsectors.

However, the key shortfall here is that, although doctoral candidates have a general view of important skills needed for the future, they seem to miss out some important knowledge about what is really important on the job market, that is in industry, service and primary sector. The same was found in the interviews with doctorate holders, currently employed in industry. Some of them stress the skills that they obtained through their doctorate (e.g. presentation skills, organizing & planning, research skills) but some of them also stated the deficits of their former doctoral training: that they hadn't enough experience with working in teams, that there was little use of the skills they had obtained during their doctorate... What can be a good way to resolve this problem, is to cooperate with industry during the

doctoral project. Although most of them did not have personal experience with that, they could see the positive effects, as mentioned in the following extract:

“Some have the possibility to work with industry during their doctorate. Know that industry doesn’t always think in the same way... They have a lot more experience” (R)

We did not find a direct effect of collaboration with the business sector on the perceptions of skills. It needs to be mentioned that less than one fifth worked together with industry, service or primary sector. Nevertheless, cooperation with other sectors during a doctorate does shape the perceptions of respondents. A large percentage of the respondents who have worked with industry, also want to establish their future career there. This variable alone explains a quite large share of the variance in preference to work in industry in the future ($R^2=0.12$) and stays significant if other variables are included. Of course, it can also be the case that people who want to work in industry in the first place, choose to cooperate with this sector during their doctoral research. When asked what they saw as the benefits of their collaboration with industry/service- or primary sector (Table 2), 87% stated that they gained new skills, and 79% thought it would improve their career opportunities outside academia. Results from the R&D survey support this view. It was found that cooperation with university is an important predictor of the employment of doctorate holders (Nagelkerke $R^2=0.12$). Other important variables are sector and size of the company. Contact between industry and university leads to a better understanding of one another and increases the appreciation for certain competencies but we cannot prove this with the available data. We can only indicate that cooperation during the doctorate can open roads for future mobility between the various sectors and might reduce the mismatch between the expectations industry have and that doctoral candidates consider important.

TABLE 2. Results of perceived consequences of collaboration with the business sector^a (N=252)

<i>Consequences</i>	<i>%</i>
Gained relevant knowledge for their doctoral research	87,3
Elaborated their skills	87,0
Enriched them personally	83,3
Raises career opportunities OUTSIDE academia	79,4
Raises career opportunities INSIDE academia	38,5

Sources: [21, own calculations]

^a: industry, service & primary sector

4. DISCUSSION & CONCLUSION

We can conclude that there is still a mismatch in views of doctoral candidates and employers of transferable skills. Although a lot of the most important skills are perceived as important by both groups, and business-oriented respondents stress other qualities than academia-oriented ones, some skills which are specific to the business sector, e.g. technical skills and project management are underestimated by doctoral candidates. However, these are exactly the kind of skill requirements, together with managerial competences, underlined by the European University Association [18]. Clearly, this message has not yet reached the doctoral candidates.

We don’t know what skills Flemish doctoral candidates actually have, since we only asked about the skills they think they will need for their further career. Of course, in order to acquire skills, one needs to be aware of their importance. Therefore, not only should more opportunities be provided to acquire these skills, but doctoral candidates also should be better informed about the needs and expectations of the non-academic job-market. Previous research already observed that supervisors and other sources within academia fail to provide this kind of information to doctoral candidates [5].

What’s positive, is that the former idea of ‘One size fits all’ [4] no longer holds. Although there is a basic package of skills that every doctorate holder should have, like scientific knowledge, research skills and social skills, there exists no consensus about what other skills are important. The perception of doctoral candidates supports this view: respondents who want to stay at the university stress other skills than respondents who want to work in industry.

TABLE 1. Importance of 27 listed skills/competences according to doctoral candidates and employers¹ (in % and ranked (1-27))

<i>Transferable skills/competences</i>	Doctoral candidates: preferred sector future employment				Employers: working with			
	<i>University</i>	<i>Business^a</i>	<i>Total</i>	<i>p</i>	<i>No doctors</i>	<i>Doctors</i>	<i>Total</i>	<i>p</i>
social skills	40,3 (4)	46,8 (1)	41,9 (4)		35,8 (11)	41,4 (10)	37,8 (11)	
scientific knowledge	57,4 (2)	44,9 (2)	54,2 (2)	***	53,5 (6)	69,1 (2)	59,2 (6)	***
analytical thinking	39,1 (5)	44,9 (2)	40,6 (5)		64,5 (2)	66,0 (4)	65,1 (2)	
research skills	71,9 (1)	44,5 (4)	65,1 (1)	***	56,0 (5)	75,3 (1)	63,1 (4)	***
teamwork	28,6 (9)	41,5 (4)	31,8 (7)	***	61,7 (3)	67,3 (3)	63,7 (3)	
independence	50,8 (3)	35,1 (6)	46,9 (3)	***	46,1 (9)	43,8 (8)	45,3 (9)	
language skills	27,4 (10)	30,6 (7)	28,2 (10)		27,3 (14)	30,2 (13)	28,4 (14)	
self-confidence	25,4 (12)	30,6 (7)	26,7 (12)		20,2 (20)	16,7 (25)	18,9 (21)	
stress management	29,2 (8)	29,8 (9)	29,3 (9)		35,5 (12)	29,0 (14)	33,1 (13)	
presentation skills	37,0 (6)	27,5 (10)	34,6 (6)	**	24,5 (15)	24,7 (19)	24,5 (15)	
taking initiative	27,4 (11)	27,2 (11)	27,4 (11)		61,7 (4)	58,6 (6)	60,6 (5)	
flexibility	23,4 (14)	26 (12)	24,1 (14)		38,3 (10)	38,9 (12)	38,5 (10)	
project management	15,8 (18)	23,8 (13)	17,8 (18)	**	48,9 (8)	52,5 (7)	50,2 (7)	
learning ability	21,8 (15)	22,3 (14)	21,9 (15)		33,0 (13)	42,6 (9)	36,5 (12)	*
networking	25,3 (13)	20,8 (15)	24,2 (13)		21,6 (17)	20,4 (20)	21,2 (19)	
technical skills	14,3 (19)	19,2 (16)	15,6 (19)		77,0 (1)	65,4 (5)	72,7 (1)	**
leadership skills	10,8 (22)	17,7 (17)	12,5 (20)	**	18,8 (22)	25,9 (15)	21,4 (18)	
time management	19,1 (17)	17,4 (18)	18,7 (17)		22,0 (16)	21,6 (18)	21,8 (16)	
teaching skills	36,1 (7)	14,3 (19)	30,7 (8)	***	13,8 (26)	17,3 (23)	15,1 (25)	
writing skills	21,5 (16)	13,2 (20)	19,4 (16)	**	17,7 (23)	21,0 (19)	18,9 (21)	
negotiating skills & persuasiveness	11,4 (20)	12,5 (21)	11,7 (21)		19,5 (21)	17,9 (22)	18,9 (21)	
dealing with failures	10,9 (21)	11,7 (22)	11,1 (22)		20,9 (19)	18,5 (21)	20,0 (20)	
business skills	1,8 (27)	9,1 (23)	3,6 (25)	***	51,4 (7)	40,7 (11)	47,5 (8)	*
Dealing with diversity	7,8 (23)	5,7 (24)	7,3 (23)		21,3 (18)	22,2 (17)	21,6 (17)	
financial management	2,3 (24)	2,6 (25)	2,4 (26)		15,6 (27)	13,6 (26)	14,9 (26)	
career planning	4,3 (25)	2,6 (25)	3,9 (24)		12,8 (24)	13,6 (26)	13,1 (27)	
knowledge about IP	2,1 (26)	2,3 (27)	2,2 (27)		14,5 (25)	17,3 (23)	15,5 (24)	
N	795	265	1060		282	162	444	

Sources: [20; own calculations;21; own calculations]

¹: % indicates the percentages of the respondents who assigned a value of 1 till 7 to this specific skill (they could tick 7 items out of 27)

^a: industry, service & primary sector (respondents who preferred to work in these sectors in the future (score: 1-3) and did not prefer to stay at the university (score: 4-8))

* p<0.05; ** p<0.01; *** p<0.001

There is also no consensus in private companies: employers of SMEs stress other skills than employers of multinationals, and these views also differ across subsector. It must not come as a surprise that there is a mismatch in views of transferable skills if the business sector sends out mixed signals. It should be made clear which skills are necessary and which ones are not, which ones can be learned in a school-environment and which ones you have to learn by doing.

Contact with other sectors during the doctorate, can also be helpful in improving perceptions. Although no direct effect was found, doctoral candidates, who collaborated with business sector, mention how this enhanced their skills. Employers who employ doctorate holders stress somewhat different skills than those who don't. To study this profoundly, more research is needed on collaborative doctoral programmes and how both parties can benefit from it.

Raising awareness of the importance of doctorate holders amongst employers within business sectors can also be mentioned in this context. Just as the debate of transferable skills should also be hold more on the level of doctoral candidates, they should also be made aware of the added value of doctorate holders compared to graduates of master level. Previous research also showed differences between employers who have doctorate holders in their team and those who don't [7] and analysis of the R&D data showed us differences in views of these two groups. Contacts should be stimulated, as in increasing the number of doctoral projects in companies and providing more funding for such collaboration. This might both increase employment opportunities for doctors in business sectors, and raise the interest of doctoral candidates in careers in industry. For those who do not collaborate with other sectors during their doctorate, other events need to become more frequent where doctoral candidates and employers can meet: e.g. research- and employability fairs or training sessions with researchers from the business sector (Table 3).

This does not mean that universities need to cater completely to the wishes of industry. Original research has to remain the main component of all doctorates [14]. However, as universities cannot absorb most of their own graduates [3;4], doctoral candidates need to be prepared to make the transition to other sectors of employment. To achieve this, there is need for an open debate between academia and employers outside academia. As stated by D'Este & Patel [19], policy initiatives could contribute to building the researchers' skills necessary to integrate the worlds of scientific research and application. Creating intermediates could be one of the initiatives to smoothen the debate between the two parties, providing extra funding to raise the cooperation between universities and companies another.

This paper has tried to show that there are a lot of opportunities, both for business sector, academia and policy makers, to smoothen the path of academia to business sectors for doctorate holders. Further research is needed to uncover more of the mismatch in skills and other shortfalls.

TABLE 3. Recommendations

<i>Applicants</i>	<i>Recommendations</i>
Academic Institutes & Staff	<ul style="list-style-type: none"> - Provide needed information for future employment to doctoral candidates - Adjust doctoral training programmes both to the needs of the market and the general needs for a well equipped researcher
Employers from business sectors	<ul style="list-style-type: none"> - Initiate more contact with doctoral candidates: e.g. more doctoral projects in companies, fairs, ... - Substantive discussion of employers of different private companies and subsectors of the skills needed for researchers
Government	<ul style="list-style-type: none"> - Create intermediates to open up the debate between employers and academia - More funding for cooperation between academia and business sectors

NOTES

^[1]: The junior researchers of Antwerp (N=605) were not included in the analysis because they did not fill out the question about their perceptions about needed skills for future employment.

^[2]: Due to the fact that this questionnaire was filled out by mail order and not online, 15% indicated more than 7 items. This accounts for (slightly) higher percentages on the employers' side than of the doctoral candidates, but does not influence the ranking of the skills.

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