Chapter 1

Issues in transferable skills training for researchers

Transferable skills can play an important role in supporting researchers' diverse career paths, ultimately promoting better research outputs and helping to underpin innovation and economic growth. These skills have attracted more attention over time, as non-academic employment opportunities grow and research becomes more interdisciplinary and international. The literature suggests formal training for PhD candidates and other researchers as one key channel for transferable skills acquisition as a complement to informal training and workplace experience. It also considers that governments, individuals, universities and other stakeholders share responsibility in designing, funding, organising and providing this training. However, questions remain about the skills required at different career stages, the best methods of acquiring transferable skills, and the exact role of government relative to other stakeholders.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

1.1. Introduction

Researchers' competencies are directly related to the effectiveness of investments in research and development (R&D) for boosting innovative capability and prosperity, not only at firm level but also at regional and national levels. Public expenditures on researcher training and support are therefore significant in many countries; private expenditures can also be considerable. It is important that these investments in researchers' training and careers yield commensurate benefits for their economies and firms.

Researchers work in many fields and their knowledge is highly valued in many employment contexts. Universities and public research institutes as well as business employ many researchers. In fact, 63% of OECD researchers worked in the business sector in 2007. Today, career paths are evolving owing to the greater use of science and technology (S&T) in some industries, the large numbers of PhD graduates relative to the demands of the academic job market, the increasing circulation of workers among research occupations, and policies that encourage intersectoral mobility (Gilbert *et al.*, 2004; *Nature*, 2011; OECD, 2006).

In parallel, the skill needs of researchers are also evolving. The structure of research is increasingly collaborative and multidisciplinary, and the boundaries between research and its application are diminishing (Commonwealth of Australia, 2011). This creates demands for skills in areas such as management, multidisciplinary project administration and intellectual property. In some countries changes in economic activity may pressure researchers to network and to integrate their scientific knowledge with other disciplines and competencies (Hill, 2007). In short, researchers today face new academic pathways and expanded opportunities to work in other sectors, as well as pressures to consider a wider variety of career paths and to use a wider variety of skills in their everyday work.

To meet these challenges, researchers need skills that will allow them to work in and move between different sectors during their working lives and to cope with networked, interdisciplinary modes of work. These are skills that are relevant in a wide variety of sectors and situations and can contribute to better research, with implications for countries' scientific, technological and innovative performance. They are here called transferable skills. Drawing on definitions proposed by the European Science Foundation (ESF) (2009, p. 47),[1] they are defined as:

> "Transferable skills are skills learned in one context (in this case, research) that are useful in another (for example, future employment whether in research, business, etc.). They can serve as a bridge from study to work and from one career to another, as they enable subject- and research-related skills to be applied and developed effectively in different work environments. They include skills such as communication skills and organisational skills."

While researchers acquire such skills in the course of their studies and everyday work, increasing attention is being paid to the formal development of transferable skills, particularly in higher education programmes, and the variety of training opportunities has expanded. There is now a stronger skills orientation in research degrees, with research increasingly viewed as a professional practice requiring common basic standards and certain expertise (Gilbert *et al.*, 2004). It also fits with a heightened emphasis on employability, as governments seek to address concerns about graduates' readiness to work.

There is a need for more comprehensive information about transferable skills training for researchers. Some studies have identified insufficient proficiency in certain transferable skills, such as communication. Others have pointed to a lack of training opportunities for certain groups. Still others have highlighted the relevance of training as a potential area for improvement (Box 1.1). Furthermore, as researchers continue to pursue opportunities across the globe, and education and qualifications become increasingly "tradeable" goods, cross-country analysis of transferable skills training systems is becoming more and more relevant (Scholz, 2011).

This report is based on an exploration of transferable skills training for researchers. The aim of the study was to help governments, as major actors in researcher training, to consider whether current national approaches provide appropriate support to researchers seeking to improve their transferable skills. With a focus on countries' government- and institution-level policies on formal training in transferable skills for researchers, it collected evidence on current training arrangements in order to identify patterns and potential policy issues. The study takes a first step towards analysing researchers' transferable skills by providing new information on formal training for transferable skills. However, information on the skills thereby acquired by researchers and the related outcomes in terms of research outputs, mobility, etc., is limited.

Box 1.1. Taking stock: weaknesses in current training in transferable skills

Various studies have suggested that researchers' transferable skills should be broadened. A study of collaborative PhD programmes by the European University Association (EUA) found that companies were satisfied with the knowledge and research skills of European PhD graduates, but saw room for improvement in communication skills, awareness of intellectual property issues, and understanding of business operations (EUA, 2009, p. 8). Similarly, a small survey of businesses in the United Kingdom found that employers valued doctorate holders' specialist knowledge, analytical thinking and research skills, but found deficiencies in skills related to employability and "commercial *nous*" (CIHE, 2010). An Australian study identified communication, teamwork, and planning and organisational skills as areas for improvement (The Allen Consulting Group, 2010, p. viii). Studies from the United States, cited in a review of graduate education, suggested that employers want more emphasis on broader skills (Wendler *et al.*, 2010, pp. 35-36). Other reports have raised similar issues (OECD, 2011, pp. 105-106).

Some studies have noted potential gaps in training opportunities. The European Science Foundation (ESF) suggested that post-doctoral researchers have not been a key target for such training programmes (2009, p. 22-23). A 2009 survey of research staff in United Kingdom higher education institutions found strong interest in training in areas related to personal or transferable skills, but relatively few researchers had participated in such activities (Vitae, 2009a); while 54% of research staff wished to undertake training in "career management", only 16% had done so. Similar patterns were found for training in the areas of "leadership and management" and "knowledge transfer and outreach activities", perhaps an indication of unmet demand for training. A follow-up survey in 2011 revealed analogous results (Vitae, 2011a, p. 31). In Australia, few research students report having participated in training for university teaching during their course of studies, and many indicated that their degree did not prepare them particularly well for careers outside of academia (Edwards *et al.*, 2011, p. x).

At the same time, researchers are not always interested in transferable skills training. The United Kingdom's Hodge Review (2010, p. 25) suggested that research staff may be less motivated to participate in skills training than PhD students, as their priorities (reinforced by peer pressure) lie elsewhere (*e.g.* developing specialist knowledge, publishing, seeking funding, etc.). Vitae's survey results pointed to a potential lack of demand for some types of training: more than 50% of researchers said training for teamwork was of no interest to them. This prompted Vitae to recommend that higher education institutions "further promote the value of transferable skills (such as team-working) for future employability in order to increase the level of take-up of development activities" (Vitae, 2009a, p. 26). De Grande *et al.* (2011) found that, compared to employers' valuations of such skills, PhD candidates undervalued skills such as teamwork for their career development.

There may also be room for increasing the relevance and quality of training offerings. The Australian government commented that universities have had little incentive to incorporate the needs and potential contributions of employment sectors other than academia in their research training activities (Commonwealth of Australia, 2011, p. XII). It saw a need to ensure that training keeps pace with the changing nature of research and the employment environments in which it occurs (p. 21). The OECD (2006) found scope for bringing PhD training closer to market needs and considered that training which helped young productive researchers to achieve independent researcher status would be beneficial. Vitae (2009a) found relatively high percentages of researchers who had undertaken training in some areas of personal and transferable skills (*e.g.* career management) but had not found it useful. Improving the content and delivery of transferable skills training could make it more attractive to researchers.

The following pages set the scene with a short review of the relevant literature. After defining the scope of the skills concerned and presenting basic data on the researcher population in OECD and selected economies, it expands on the importance of transferable skills for career development and research, the role of training in transferable skill acquisition, and possible roles of governments, individuals and other stakeholders in the training process. The literature review is based on English-language materials, mainly articles in academic journals, publications of the OECD and European-level institutions and reports prepared by or for governments (particularly in the United Kingdom). It is therefore not exhaustive. Moreover, the perspectives of stakeholders such as individual universities and research institutions are not well represented.

Chapter 2 presents cross-country information on patterns in transferable skills training strategies and programmes for researchers. The information is principally based on responses to a policy questionnaire distributed to relevant government officials and selected universities, research institutions and other organisations.[2] Information was received from questionnaire respondents in 17 countries (see Annex A); separate summary information was also provided by delegates of seven countries. Annex B contains more detailed country-level information.

Chapter 3 focuses on the policy implications of the study raised during discussions among OECD delegates and expert practitioners at a workshop in November 2011, which examined the results of the policy questionnaire and debated their policy significance debate. Annex C contains the workshop programme. The chapter concludes with suggested policy directions based on the evidence and expert inputs collected throughout the study.

1.2. Definitions and the scope of the study

The term "transferable skills" can include many competencies, and its precise definition may differ from study to study. Other terms, such as "generic competencies", "transversal competences" or "professional skills" are also used to describe certain transferable skills. This study draws on the ESF definition given above and includes the ESF's list of 17 transferable skills (ESF, 2009, p. 48). These skills are grouped here into six broad categories to form a broad typology of "transferable" skills (Table 1.1).

Table 1.1. Transferable skills

Transferable skill category	Skills included:
Interpersonal skills	* Working with others/teamwork * Mentoring and supervisory skills * Negotiating skills * Networking skills
Organisational skills	* Project and time-management skills * Career planning skills
Research competencies	* Grant application writing skills * Research management and leadership * Knowledge of research methods and technologies beyond the PhD project * Research ethics and integrity
Cognitive abilities	* Creativity and the ability for abstract thought * Problem solving
Communication skills	* Communication/presentation skills, written and oral * Communication/dialogue with non-technical audiences (public engagement) * Teaching skills * Use of science in policy making
Enterprise skills	* Entrepreneurship * Innovation * Commercialisation, patenting and knowledge transfer

Source: ESF (2009), grouped into categories by author.

"Formal training" refers to training that is organised, systematic and, for the purposes of this study, has as its explicit aim to build recipients' transferable skills. It can include courses in universities, workplaces and other organisations designed to help participants learn about, and improve their capabilities in, transferable skills. Such formal training may be provided by academic institutions, specialised training providers or other entities. It does not include acquiring skills as a by-product of everyday activities or usual academic classes (learning which could be classed as "informal" training). However, workplace experience programmes (*e.g.* student work experience or "industrial PhDs"), may perhaps be categorised as "formally organised informal training" and were included.

Finally, the term "researcher", as used in this study, encompasses PhD candidates, post-docs (defined as PhD graduates in their first two years of research work after graduation), other early-stage researchers (defined as non-doctorate holders in their first two years of research work) and research personnel (defined as research staff who have been in the research workforce for more than two years).[3] The study aims at researchers at different career points and recognises that there is not necessarily a linear progression from PhD studies to research jobs. In fact, most researchers do not hold a PhD degree (Auriol, 2010, p. 16). Where noted by countries the report describes examples of formal training in transferable skills for Master's-level students. However, the general term "researcher", as used in this study, does not include this latter group. Box 1.2 gives the OECD task- and job-related definitions of researchers.

Box 1.2. Defining researchers

The *Frascati Manual* provides definitions of R&D personnel, including researchers, for the purposes of gathering statistics. The definitions are used to measure the human resources dedicated specifically to R&D, although these personnel also undertake non-R&D activities such as production, quality control, education and management (OECD, 2002, p. 20). In the *Frascati Manual*, researchers are defined as professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned (p. 93). This definition includes postgraduate students at the PhD level engaged in R&D.

The *Canberra Manual* (OECD, 1995) can be used to identify the occupations encompassed by the Frascati definition of researchers. Here, researchers include physicists, chemists and related professionals, mathematicians, statisticians and related professionals, computing professionals, architects, engineers and related professionals, life science professionals (*e.g.* biologists, pharmacologists and agronomists), health professionals (except nursing), college, university and higher education teaching professionals, business professionals, legal professionals, archivists, librarians and related information professionals, social science and related professionals (*e.g.* economists, sociologists and historians), and research and development department managers. These groups are drawn from ISCO-88[1] groups 21, 22, 23 and 24, plus group 1237.

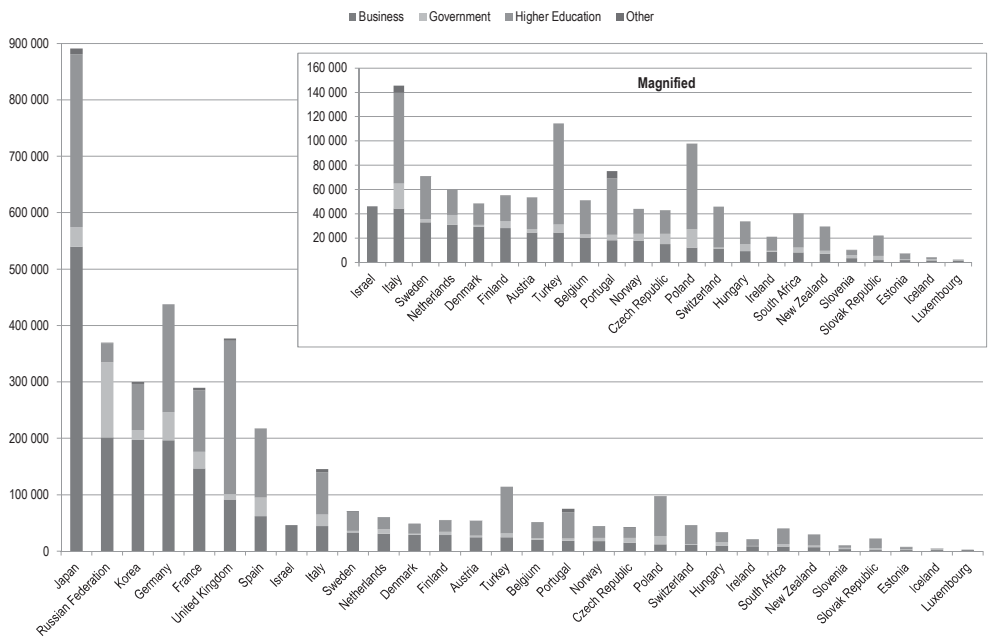
1: ISCO-88 has been updated to ISCO-08. A correspondence table is available at *www.ilo.org/public/english/bureau/stat/isco/isco08/index.htm*.

1.2.1. Characteristics of the researcher population

The researcher population in OECD countries is small but growing, and it is an "employment-significant" group of people who may be affected by government- and institution-level policies on transferable skills training. However, when discussing transferable skills policies, attention must be paid to the potentially different challenges faced by different countries. For instance, the extent to which researchers are employed in different sectors (*e.g.* business *versus* government), and their mobility between sectors, varies across countries. The share of researchers with a PhD degree also differs by country and sector. These factors may influence the kinds of transferable skills needed by researchers and the way in which they are best learned.[4]

Figure 1.1. Researchers by sector of employment (headcount)

2008 or nearest year, available countries



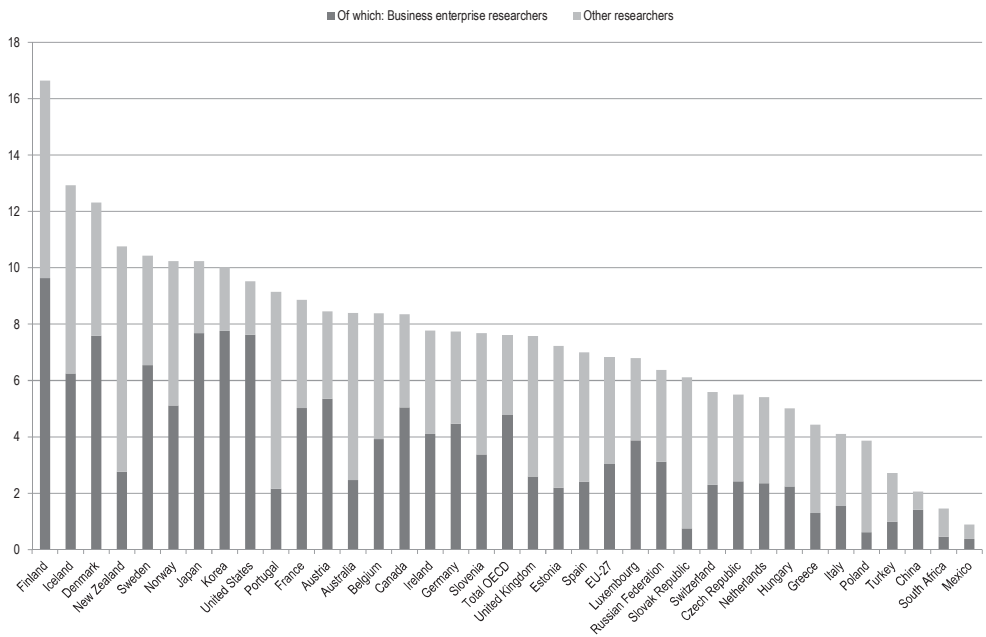
Note: "Other" calculated as a residual. 2007 for Austria, Belgium, Germany, Luxembourg, the Netherlands, New Zealand, South Africa, Sweden and the United Kingdom. 2009 for the Czech Republic, the Russian Federation, the Slovak Republic and Turkey. Headcount data not available for China or the United States.

Source: OECD Main Science and Technology Indicators Database, February 2011.

Figure 1.1 shows that countries' researchers and their sector of employment differ considerably. The number of individuals employed as researchers, working full- or part-time, ranged from less than 3 000 in Luxembourg to over 890 000 in Japan.[5] Headcount data is not available for the People's Republic of China or the United States; however, in full-time-equivalent (FTE) terms, each of these countries had over 1.4 million researchers in 2007.[6] This indicates the number of people currently involved in research (roughly 4 million in all for the countries in Figure 1.1, plus at least 2.8 million in China and the United States) who could potentially be affected by researcher training policies. On the basis of headcounts, Denmark, Japan, Korea and Luxembourg had a relatively high share (over 60%) employed in the business sector. Other countries had relatively high shares of researchers in the higher education sector, over 60% in Estonia, New Zealand, Poland, Portugal, the Slovak Republic, South Africa, Sweden, Turkey and the United Kingdom. The share employed in the government sector was generally small, with only Iceland, Luxembourg, the Russian Federation and the Slovak Republic having more than 20% of researchers in this sector.

Figure 1.2. Total researchers (FTE) per thousand total employment

2009 or nearest year, available countries



Notes: 2007 for Canada, Greece, Mexico, New Zealand, South Africa, the United States and the OECD aggregate. 2008 for Australia, France, Iceland, Japan, Korea, China and Switzerland. Chinese data do not correspond precisely to the *Frascati Manual* recommendations. 2010 for the United Kingdom.

Source: OECD Main Science and Technology Indicators Database, February 2011.

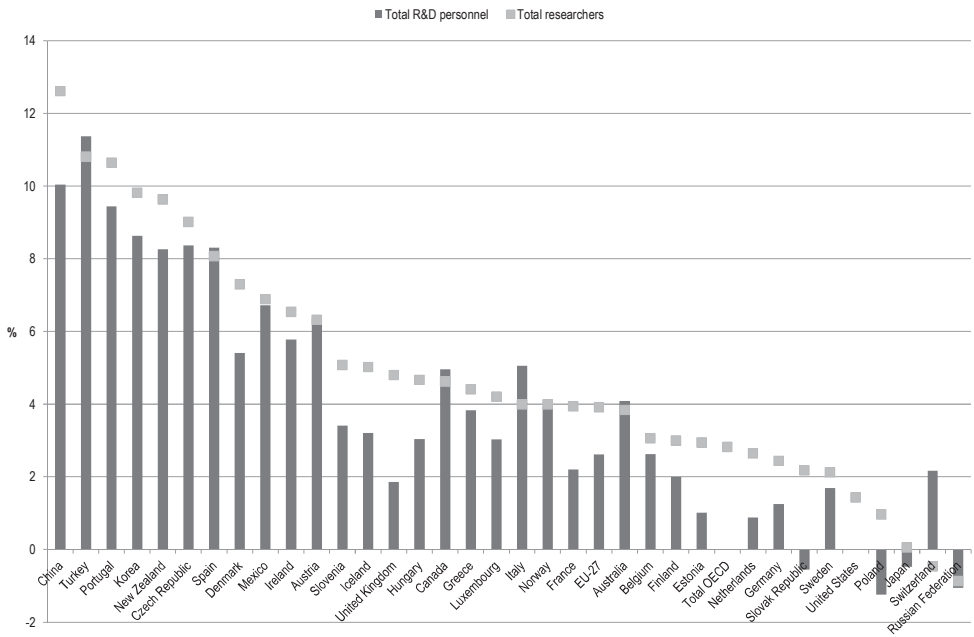
Figure 1.2 presents researcher numbers as full-time-equivalents and compares these to total employment in each country to show the significance of researchers in the economy. While Japan, the Russian Federation, Korea, Germany and France had the biggest absolute numbers of full- and part-time researchers in Figure 1.1 (along with China in FTE), the relatively small countries of Denmark, Finland, Iceland, New Zealand and Sweden had the biggest shares of researchers in total employment. There were more than 16 researchers per 1 000 employees in Finland in 2009, for instance, compared to an OECD average of fewer than eight.

When measured in FTE, the number of countries with a relatively high share of researchers in the business enterprise sector increases – Austria, Canada, China, Denmark, Japan, Korea, Sweden and the United States had more than 60% of researchers employed in the business sector. The different country patterns reflect aspects of their industrial structure, such as the presence of R&D-intensive sectors and the share of higher education in overall employment, as well as the incidence of part-time employment in each sector. Despite differences, however, the data suggest the importance of researchers possessing both research skills and skills that help them to function effectively in a business environment.

Figure 1.3 shows that researchers as a group have been growing strongly in many countries, highlighting the increased relevance of analysing their skills and competencies. While they grew by over 12% a year in China, they also grew by more than 6% a year in Denmark, Korea and New Zealand. For some countries, fast growth represents "catch-up" in terms of numbers of researchers in the workforce. Growth in the total number of researchers is also relatively responsive to business R&D spending (OECD, 2010, p. 44); rapid increases in the intensity of business enterprise R&D expenditures in China, Korea and Turkey over the past decade parallel the growth in researchers. Figure 1.3 shows that growth of researchers was faster than that of R&D personnel (researchers plus related staff) in most countries. This may be partly due to rapid growth in postgraduate student numbers and rebalancing between research and administrative staff.

Figure 1.3. Growth of R&D personnel and researchers (FTE), 1998-2008 (or nearest available period)

Compound annual growth rate (%), available countries



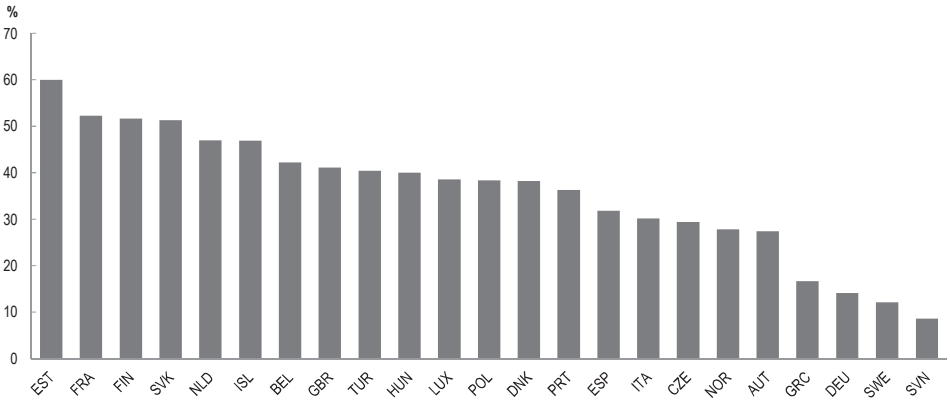
Note: For both series, Canada 1998-2007, Denmark 1999-2008, Greece 1999-2007, Luxembourg 2000-08, Mexico 1998-2007, New Zealand 1999-2007, Norway 1999-2008, Sweden 1999-2008 and Switzerland 2000-08. For the data series on researchers, United States 1999-2007 and OECD aggregate 1999-2007.

Source: OECD Main Science and Technology Indicators Database, February 2011.

Figure 1.4 depicts the intersectoral mobility of human resources in science and technology (HRST) (of which researchers are a part) for selected countries in 2010. While the data should be treated with care, as they pertain to a year in which many countries suffered significant economic upheaval, they show that skilled people have the potential to apply their knowledge in different economic sectors and highlight the relevance of skills that enable people to work effectively in different environments. At the same time, they also show how mobility patterns may be quite different across countries. Between 2009 and 2010 more than half of the HRST in Estonia, Finland and France who changed employers reported a change in their sector of economic activity. In contrast, most HRST mobility in Germany, Slovenia and Sweden occurred within sectors.

Figure 1.4. Intersectoral mobility of HRST, 25-64 year-olds, 2010

As a percentage of HRST changing employer

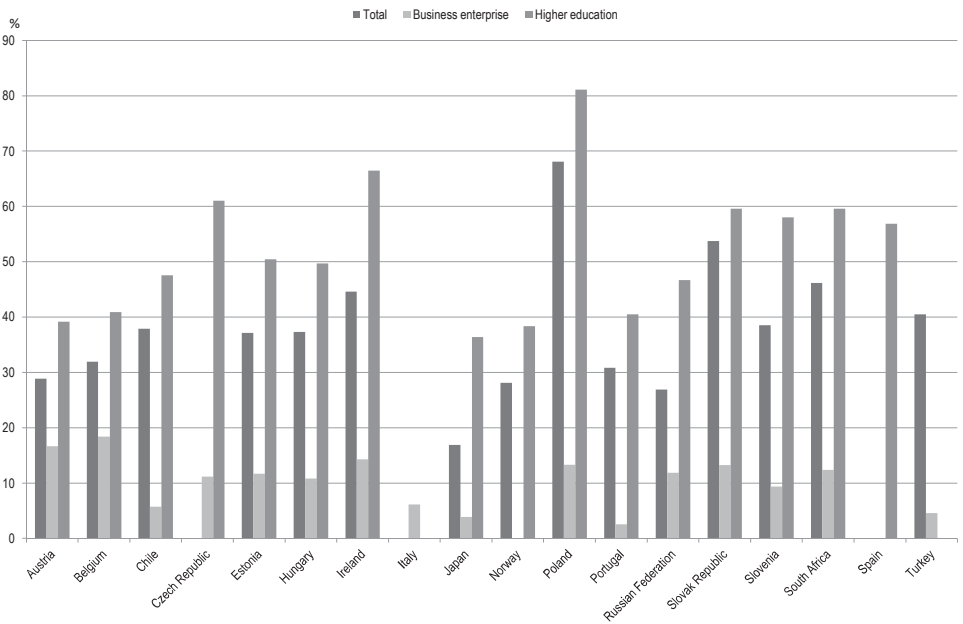


Note: Limited data reliability for the Slovak Republic.

Source: OECD, based on *ad hoc* tabulations of European Labour Force Surveys, Eurostat, May 2011.

Figure 1.5. Percentage of researchers (headcount) with a PhD degree, by sector, 2008 (or nearest available year)

Available countries



Note: 2007 for Austria, Belgium and South Africa.

Source: OECD Research and Development Database, March 2011.

Finally, Figure 1.5 shows the percentage of researchers with PhD qualifications, in total and by sector. It illustrates the point made earlier that many researchers do not hold doctorate degrees. In general, for countries with data, less than half of total researchers have doctorates, with Poland and the Slovak Republic as exceptions. The share of researchers with doctorates is larger in the higher education sector; for the countries shown, the share of business sector researchers with doctorates is often below 40%. This highlights the variety of educational pathways for researchers and suggests that approaches to transferable skills training cannot focus on the PhD level alone.

1.3. Transferable skills for a diversity of careers and better research

Empirical studies suggest that researchers follow a variety of career paths. Data on PhDs, for instance, show that careers in academia are important, but that many other options are also available, both in terms of the sector of employment and the type of work done. An analysis of 12 countries participating in the OECD/UNESCO Institute for Statistics/Eurostat project on Careers of Doctorate Holders (CDH) found that the share of recent PhD graduates[7] employed in higher education ranged from 21% in Austria to over 80% in Poland while the business sector employed more than a third in Austria, Belgium and the United States (Auriol, 2010). Other studies have also found researchers in a range of non-academic positions (Box 1.3).[8]

Researchers also move among sectors during their careers. For example, evidence shows that research students both aspire to and expect to work in different sectors during their careers. In an Australian survey, 63% of research students (those enrolled in PhD and Master's degree courses) wanted to work in academia in the near term, but only 52% considered this a realistic goal, and only 54% wished to work in academia five to seven years after completing their degree in any case (Edwards *et al.*, 2011, p. 22). A United Kingdom study of career pathways of PhD graduates within and between six occupational clusters found "an unexpected degree of mobility between different occupations and employment sectors, usually associated with progression, and a significant proportion creating their own unique paths" (Vitae, 2011b, p. 3). While 23% of the graduating cohort studied started working in higher education research, 40% had moved to a new occupational cluster after three or four years, including higher education teaching/lecturing (11%), research in the non-higher education sector (8%), other common PhD occupations (such as R&D manager) (5%) and other occupations (such as trainee patent attorney) (5%) (p. 8). Participants in the European-level DOC-CAREERS study concluded that career paths of doctorate holders are very diverse both within and outside academia and cannot easily be slotted into a typology (EUA, 2009, p. 71).

Box 1.3. Where are doctorate holders working?

The European-level DOC-CAREERS project found that half of current doctorate holders have research and non-research positions in businesses, governments, service sectors and other education sectors (EUA, 2009, p. 7). The report pointed out that not all PhD candidates can or want to work in academia. Some individuals simply see PhD-level education as the best training in their field and good preparation for a variety of career paths (p. 71). This may vary by field; a United Kingdom study found that the share of PhD graduates employed in research occupations varied from 7% for theology to 71% for microbiology and biochemistry, molecular biology and biophysics (Vitae, 2009b, p. 6).

A survey of United Kingdom PhD graduates provided details on their employment and work characteristics approximately three and a half years after graduating (Vitae, 2010). While half of respondents were working in higher education or in schools, colleges or training providers, they were also employed in sectors such as health and social work (13%), finance, business and information technology (11%), and R&D (9%). Teaching and lecturing was the most common occupation (27% of respondents), followed by scientific research, analysis and development (19%), other professional, associate professional and technical occupations (17%) and commercial, industrial and public sector managers (10%), and 90% reported being very satisfied or fairly satisfied with their career to date.

Studies outside Europe provide similar results. In 2006, only 26% of doctorate holders in Australia were employed as university and vocational education teachers, and only 28% of recent doctorate holders in 2008 were employed in higher education (Commonwealth of Australia, 2011, p. 22). The rest had found employment in a wide range of other public and private sectors. United States data show that most PhDs work in service occupations, generally professional, scientific and technical services, or in government (Wendler *et al.*, 2010, p. 19). The share differs by field; PhD recipients in engineering and physical sciences are much more likely to work outside academia than those in social sciences and humanities (p. 17). International students (those with temporary visas) were more likely to have positions in industry than in academia, compared to United States citizens (p. 25).

Various national and cross-country studies and statements have identified the acquisition of transferable skills as important for researchers' careers. They can enable PhD graduates to acquire work (either in academia or another sector), allow more experienced researchers to explore opportunities for intersectoral mobility, or simply enable researchers to work more effectively in their chosen research environment. Commentary focuses mainly on the implications for doctoral education and on calls for increased inclusion of transferable or "workplace-relevant" skills in PhD programmes (Box 1.4). These skills are seen as a vital way to boost graduates' employment prospects in the broader job market and to help them pursue a variety of professional paths. In a comparative study of seven national research systems, Technopolis commented that "utilisation and employability are new keywords beside scientific quality" in research training (2011, p. 18). Similarly, the Australian

government suggested that changes in the way research is conducted and the variety of sectors in which researchers are employed "demands a contemporary approach to research training which continues to focus first and foremost on the development of the 'scholar' but places increased emphasis on the 'employee' and 'innovator'" (Commonwealth of Australia, 2011, p. 22). In addition, learning opportunities beyond initial training are also crucial. As noted by Wendler *et al.* (2010, p. 43), many individuals have sequential careers and require training and retraining.

Box 1.4. Transferable skills for a diversity of careers

In the early stages of launching the European Research Area, a European Commission Communication noted that research is increasingly conducted in "non-academic" institutions, such as companies, non-profit organisations and independent research centres, and that researchers need to be trained and prepared to enter this wider job market (EC, 2003, p. 14). The document highlighted the need to enhance the employability of researchers by providing wider employment-related skills (*e.g.* research management, communication skills, networking and team-working). Similarly, the ESF (2009, p. 12) noted that research careers are now less path-dependent and more likely to develop into "portfolio careers", and that only a small fraction of PhD candidates take up an academic career. It also concluded that researchers in all sectors require competencies beyond their field and need to acquire transferable skills throughout their careers. Later, the EUA reaffirmed the importance of training in transferable skills, including understanding the ethics of research, and recommended this as a priority for doctoral schools and programmes (2010).

Acknowledging the growing trend towards research careers outside academia, one of the seven key "aspirations" of Australia's Research Workforce Strategy is for research graduates to have the skills to "engage in world-class research and make productive contributions in a wide spectrum of professional roles" (Commonwealth of Australia, 2011). In an analysis of the future of PhDs, the journal *Nature* (2011, pp. 277-278) noted that in Germany and Singapore, doctoral training is seen as preparation for employment in a wider workforce outside academia. In Germany, many PhD students have structured courses in topics such as presentation, report writing and other transferable skills. Fiske (2011) suggested that focused training in areas such as communication and business basics "would go a long way towards strengthening the capabilities of PhD students and improving their career prospects". In the United States, an analysis of graduate education showed that master's programmes increasingly combine theory, practical application and workplace skills (such as critical thinking) to give students more choices in business, government and non-profit organisations (Wendler *et al.*, 2010, p. 18).

Evidence on employment underlines the importance of transferable skills. In response to a United Kingdom survey, 60% of PhD graduates said they used the generic skills developed as research students most of the time in their work (Vitae, 2010, pp. 34-37). This was particularly true for graduates in social sciences, physical sciences and engineering and for those employed in research occupations, whether in higher education or another sector. Vitae noted that this finding was aligned with an increasing focus on developing researchers' personal and professional skills in addition to their specialist skills. Employers have expressed the needs for graduates with business, communication and leadership skills (OECD, 2011, CIHE, 2010).

By helping researchers to pursue fulfilling and diverse careers, transferable skills may also contribute to better research outputs. The Korean Institute of R&D Human Resource Development (KIRD, 2010) suggested that transferable skills can help to maximise research outputs by enabling research personnel to be more effective in their research, as well as adaptable and flexible in an increasingly mobile and global research environment.

An area in which transferable skills may be increasingly important is in collaborative and cross-disciplinary work, including in teams. The capacity of researchers to communicate with others is essential for interdisciplinary work (EUA, 2009, p. 87). Mann and Marshall (2007) noted that the increased emphasis on multidisciplinary project teams at Australia's CSIRO required team leaders able to manage and motivate staff from a range of scientific disciplines who may be working together for the first time. More broadly, they found that the most significant differentiators between the most and the least effective teams were soft skills/interpersonal factors such as trust, goodwill and co-operation, and leadership. They considered that development of leadership and learning about conflict resolution, brainstorming, team learning and creative dialogue would have positive impacts on trust within teams and would contribute to better knowledge flows and performance. In addition, the study identified advocacy, sponsorship and strategic communication with external stakeholders and the public as important new roles for team leaders in order to support the socioeconomic integration of scientific research. Given the emphasis on collaborative, multidisciplinary and globally oriented approaches to research activity, the Australian government is reassessing training programmes and researchers' preparedness for diverse careers (Commonwealth of Australia, 2011, p. 11).

Ultimately, improving researchers' transferable skills may help generate innovation and improve economic outcomes. The European Union put great emphasis on the quality of its human resources in achieving its Innovation Union aspirations. It identified skills such as creativity, entrepreneurship, teamwork, risk-taking and project management as essential "in order to increase the innovation performance of individuals, to improve the competence

of private and public organisations, to facilitate knowledge and technology transfer, and thus to improve the overall competitiveness and the attractiveness of Europe as a region" (EC, 2010, p. 34). Similarly, the OECD (2011) found various "generic" or "soft" skills, as well as managerial and entrepreneurial skills and creativity, frequently mentioned as important for innovation. Highlighting the importance of communication and teamwork, Herrmann and Peine (2011) found that the innovative capacities of scientists stemmed partly from exchanging ideas with colleagues, and that interaction between adequately skilled employees and knowledgeable scientists was an important source of innovation.

National governments have also made the link to enhanced research and innovation outcomes. Policy directions in the United Kingdom have recognised the importance of researcher development for overall R&D capacity and allocated around GBP 20 million a year between 2003 and 2010 for career development and transferable skills training across all research disciplines (Hodge Review, 2010, p. 9). The Impact and Evaluation Group (2010) stated that "researcher development provides a key enabling link from knowledge creation to pathways to impact". It concluded that researcher development not only benefited individual researchers but is crucial for realising the potential of research and maximising outcomes from research funding. It noted opportunities for linking researcher training and economic impact through the analysis of longitudinal data. The Australian government indicated that the combination of highly specialised skills with more generic, high-level cognitive and technical capabilities had enabled researchers "to contribute to some of the most transformative innovations developed in Australia in recent times" (Commonwealth of Australia, 2011, p. 1). It noted that research and its application are often intertwined and researchers are increasingly exposed to commercial product and process development and the intellectual property and financial frameworks in which this occurs (p. 22).

1.4. Acquiring transferable skills – the role of formal training

If transferable skills are a valuable asset for researchers' careers and research, how should they be acquired? Formal training plays a part in preparing researchers for the variety of activities that they undertake in working life. For two broad researcher groups – PhD candidates and researchers in the workplace (*i.e.* post-doctoral graduates, other early stage researchers and research personnel) – this section discusses why formal training is a useful tool.

1.4.1. Training for PhD candidates

Doctoral candidates benefit from acquiring transferable skills during their studies, as these help them complete their PhD projects successfully and gain employment. In a survey of PhD students and post-docs, perceptions of the skills required for a PhD included a number of transferable skills, such as time management, writing skills, oral presentations, research skills (data gathering), teaching, interpersonal skills and computer skills (Pritchard *et al.*, 2010). Interviews with companies have shown that skills and attributes such as "originality and creativity", "team player" and "explain and communicate to non-specialists", are highly valued alongside technical proficiency (EUA, 2009, p. 86). These skills are seen as vital for enabling researchers to play managerial roles, to react quickly and effectively to unforeseen situations and to be flexible. There are also wider benefits from the acquisition of transferable skills at the PhD level. For instance, Gilbert *et al.* (2004) concluded that a key purpose of research degrees is to allow students to contribute to technological, economic, social and cultural pursuits beyond the university, and to the extent that both disciplinary research skills and generic skills of application and exploitation are part of this, both are clearly important.

While some transferable skills may be acquired informally during PhD studies, the massification of postgraduate education has meant that formal training in transferable skills has become more prevalent. In the United Kingdom, the Hodge Review suggested that the increasing number of postgraduate researchers has put pressure on the traditional "apprentice-master" relationships of researcher training, making formal training more important (2010, p. 11). Traditional training may also have delivered training of variable quality; the Hodge Review noted that it depended greatly on the personalities involved and the environment of individual researchers. In a number of countries, such considerations have led to the establishment of graduate and doctoral schools, specific organisational structures that cater for the needs of postgraduate and/or PhD students, including provision of transferable skills training (Box 1.5).

Box 1.5. Graduate schools and transferable skills

The concept of graduate schools emerged in North America in the 1960s (Denicolo *et al.*, 2010, p. 15) and has since expanded to other countries. Graduate schools are usually organised across the whole of a university, while doctoral schools (a similar construct) tend to be organised along thematic lines and may cross disciplines and institutions (LERU, 2010, p. 9). These schools typically provide a range of support for postgraduate students, including opportunities for training in various generic or transferable skills. Doctoral schools were created in France in the early 1990s to develop "soft skills" that facilitate the entry of new PhD graduates on the labour market (Auriol, 2010, p. 6). In the United Kingdom, over 75% of universities now have graduate schools, most of which are strongly involved in generic skills training programmes (Denicolo *et al.,* 2010, pp. 19 and 29). A recent study of Canada, Denmark, Finland, the Netherlands, New Zealand, Sweden and the United Kingdom found that postgraduate education is increasingly delivered in graduate or research schools; this training is often multidisciplinary and includes organised networking activities and skills beyond the academic specialty (Technopolis, 2011, p. 14).

Formal training in transferable skills may be particularly valuable for female and international students. In a study of late-stage PhD students in science, engineering and medical disciplines at Imperial College, London, Walsh *et al.* (2010) found that relatively more female and overseas students considered opportunities for transferable skills training to be very important than male and domestic students. It was suggested that females may perceive academic careers more broadly than men, and thus value transferable skills more highly. It was also suggested that women may have more difficulty accessing networks or mentoring and may therefore obtain additional benefits from training. Walsh *et al.* proposed that the language and cultural adjustment issues experienced by some international students might also lead to greater gains from training opportunities.

Formal training during PhD studies may also lead to positive attitudes towards ongoing learning. The Impact and Evaluation Group (2010) found that transferable skills training and the increase in programmes offered to researchers had "changed the culture" in institutions as researchers and supervisors saw the benefits of transferable skills training. A study by Walsh *et al.* (2010) also reported that participants in a residential training course developed more positive attitudes to skills training.

Box 1.6. Different skills for different career stages?

There appears to be no consensus regarding which transferable skills are most needed at different career stages. The ESF (2009, p. 13) noted knowledge gaps regarding "what kinds of skills are especially beneficial to the career development of researchers at a given stage". In particular, the relative importance of certain skills may vary over time (*e.g.* leadership might become increasingly important in later career stages) (p. 48). Education institutions also question the appropriate mix of skills to deliver to students. Gilbert *et al.* (2004) speculated whether writing, communication and basic research skills ought to be established before entrance to PhD programmes, and whether some work-related skills should be obtained in a post-degree pre-vocational course. Edwards *et al.* (2011, p. 92) found that teaching training is often delivered once a new graduate has been appointed to an academic position. In the United Kingdom, the Concordat to Support the Career Development of Researchers (2008) suggested that employers and funders of researchers consider articulating the skills needed at each stage of the career development framework and encourage researchers to acquire and practice these skills. However, it did not identify specific matches. Surveys of students provide some evidence on required skills, although samples may be small and the results strongly affected by students' assessment requirements. Pritchard *et al.* (2010) found that students in their first and second years found technical skills important (*e.g.* learning to operate equipment), third-year students identified communications skills (particularly thesis writing and communicating with non-academics), and post-docs identified people management skills. Leggett *et al.* (2004) also found that students' perceptions were closely related to the assessment framework and the tasks set for students.

Attempts have been made to set out skill requirements at certain career points. The Joint Skills Statement (JSS) of Research Councils United Kingdom (RCUK), in conjunction with the United Kingdom GRAD programme in 2001, set out the skills that PhD research students funded by Research Councils would be expected to develop during their training.[1] The more recent Researcher Development Statement (RDS) provides an up-dated perspective on the knowledge, behaviours and attributes that researchers need to work effectively. The detailed Researcher Development Framework (RDF) proposes three to five levels/phases of performance for each researcher characteristic – phases one and two generally map to PhD-level requirements, although achievement is personal to the individual researcher.[2]

However, any categorisation of skills by career stage can only be a broad guide; researchers are a diverse group and individual choice and control over training will be crucial. The Hodge Review (2010, p. 15) highlighted that researchers have different specialisations, employment arrangements, personal needs and backgrounds and that this influences the skills they need. Walsh *et al.* (2010) cautioned that training programmes must serve the needs of all research students, and that curriculum changes (*e.g.* to incorporate more enterprise training) should be implemented carefully. Similarly, Craswell (2007) felt that the tendency to view transferable skills training in the context of employ-ability in a knowledge-based society could skew training towards the perceived needs of science students. Craswell also cautioned against notions of best practice that are not sensitive to the local situation, while Campbell (2010) noted that the value accorded to generic skills is affected by differences in social and political contexts, cultures and opportunities. Leggett *et al.* (2004) noted that oral communication may be considered more important for business, and written communication for academia. Moreover, even for quite sophisticated skills training "skills will need to be adapted to accommodate workplace exigencies" (Craswell, 2007). The EUA noted the need to recognise pre-existing skills to avoid unnecessary training that takes time away from research (2009, p. 93).

1. See *www.vitae.ac.uk/CMS/files/upload/RCUK-Joint-Skills-Statement-2001.pdf* (accessed 14 April 2011).

2. For information on the RDS and RDF, see *www.vitae.ac.uk/policy-practice/234301/Researcher-Development-Framework.html*. For details of the RDF, see *www.vitae.ac.uk/CMS/files/upload/Vitae-Researcher-Development-Framework.pdf* (accessed 20 May 2011).

However, it is difficult to identify the appropriate balance between transferable skills training and core research work. Students appear to value transferable skills training opportunities, as evidenced by their voluntary attendance (Walsh *et al.*, 2010) and their positive feedback (Gilbert *et al.*, 2004). Walsh *et al.* also found that supervisors are becoming more positive, as graduate schools and other parties describe the value and impact of training more effectively. For academic careers, in fact, Technopolis (2011, p. 19) advocated more utilitarian skills in the earlier stage of research education and moving acquisition of the scientific specialisation needed for academic work to the post-doc stage. Nevertheless, some academics and students consider skills training a distraction from core research work, and some commentators have voiced concerns about the implications for the length (and cost) of obtaining a degree if more training is included in PhD studies. Edwards *et al.* (2011, p. x) found a lack of time the most notable impediment to research students' involvement in training for teaching, and noted that inserting additional training into Australia's relatively short research degrees might diminish the time students have to complete their core studies. Industry employers also differ in their emphasis on transferable skills; for instance, the EUA found that small- and medium-sized enterprises (SMEs) set higher value on PhD graduates' "soft skills" than large R&D companies for which "the value of hiring a doctorate holder usually lies, in the first instance, in a deep knowledge of a relevant subject and broader competencies that are likely to equip the person to handle subsequent career challenges" (EUA, 2009, p. 8).

The balance between study components will be partly shaped by views on the desired portfolio of students' transferable skills. There is still uncertainty about which skills are most useful at different points of a researchers' career and, indeed, they are likely to differ depending on the sector of employment (*e.g.* academia, business, government) and the type of work (Box 1.6). This indicates that choice of training options should be a key feature of training agendas. For some transferable skills, there are also concerns that formal training in educational establishments is "out of context" or too abstract and that such skills are more effectively acquired in the workplace. For PhD students, this may imply some training through internships or similar work-based opportunities, although such concerns may also be addressed by better integrating skills training in students' courses. "Embedding" transferable skills is an increasingly popular approach,[9] although what this practically involves differs across institutes and programmes. In other instances, different teaching styles may be useful. In both cases, the quality of practitioners is vital to the success of the training.

Transferable skills training needs to complement other learning opportunities. The League of European Research Universities sees the core of doctoral education as research-based training via formal and informal meetings with the supervisor and peer researchers, complemented by more structured training (2010, p. 9). Doctoral students and post-docs also view their research groups and peer networking opportunities as important means of acquiring such skills (Pritchard *et al.*, 2010). More generally, the EUA suggested researchers need to be more aware of the implicit acquisition of skills that takes place during their PhD programme and to be able to convey this to potential employers (2009, p. 93).

1.4.2. Training for researchers in the workplace

Post-doctoral graduates, other early stage researchers and more experienced researchers all have incentives to acquire additional transferable skills during their working lives. For some, the skills obtained during PhD studies may differ from those required at work. In a survey of recent United Kingdom PhD graduates Vitae (2010) found that 47% had taken their current job to broaden their experience and develop general skills. In addition, many graduates with jobs in non-academic settings had worked alone as students but in teams as professionals; this may suggest a need for new skills. Researchers lacking doctorates may desire skills that complement those acquired at other education levels. Moreover, the ESF (2009, p. 20) noted differences in the training syllabus and skills acquired by PhDs in different faculties.

Like any professional, researchers need to keep updating and building on their existing skills. This is formally recognised in several European policy documents. For example, the European Charter for Researchers considers that researchers should engage in continuing professional development to update and expand their skills and competencies (EC, 2005). Its principles on accountability, good research practice, dissemination and exploitation of results, public engagement and managerial duties also implicitly require good transferable skill levels. Similarly, the United Kingdom's Concordat to Support the Career Development of Researchers (2008) highlights the importance of training for working researchers. It requires signatories to recognise and promote researchers' personal and career development and lifelong learning and calls on them to recognise the need for researchers to develop transferable skills, delivered through embedded training. The Concordat also considers that individual researchers share responsibility for their career development and lifelong learning.

While learning-by-doing in the workplace is an important channel for gaining transferable skills, formal training can also add value. Vitae showed that while researchers gain skills through workplace experience (*e.g.* project management, presenting work at conferences), a significant share of research

staff in higher education institutions express interest in formal training to develop their leadership and management expertise, knowledge transfer and outreach skills, and broader research skills (2009a, p. 36). As noted earlier, some skills are more context-specific than others, and opportunities to undertake formal training in their work environment may be an effective way for researchers to attain these competencies. In addition, explicit opportunities for learning via work placements and secondments may also support transferable skills acquisition. In its 2011 survey of research staff in United Kingdom higher education institutions, Vitae found that 43% of respondents to questions on support and career development wished to undertake a placement in another sector (*e.g.* business, voluntary or government) and 49% wished to undertake a secondment to another institution (Vitae, 2011a, p. 33). However, only 5-7% of respondents had done so, indicating some potential unmet demand in this area.

1.5. Roles and responsibilities in transferable skills training

The literature reviewed generally proposes that training for researchers, including in transferable skills, is a responsibility shared among funders of research, researchers, their employers or managers, research training providers, and professional associations. Ideally, the roles and responsibilities would be divided according to the benefits received and the knowledge possessed by different stakeholders. For example, in the standard analysis of education, training and lifelong learning, individuals fund their training in general skills that are portable across workplaces, while employers help fund training in workplace-specific skills that are of particular value to them (Bassanini *et al.*, 2005). For PhD studies, countries often have a mixed model of finance, with contributions from universities, external research grants, state and private scholarships, companies and individuals (Technopolis, 2011, pp. 15-16). This reflects the diverse benefits that governments, institutions, employers and individuals gain from the pursuit of advanced research studies. Certain stakeholders may also possess competencies or knowledge that make them best placed to design, fund, organise or deliver training activities. Some potential roles and responsibilities of stakeholders in transferable skills training for researchers are set out below.

1.5.1. Government

For transferable skills training, the literature mentions a number of potential roles for governments, ranging from strategic oversight and co-ordination to funding. The Australian government highlighted its role in monitoring the level and quality of skills in the research workforce, assessing where investments could be targeted and providing leadership in addressing

challenges (Commonwealth of Australia, 2011, p. 7). The EUA suggested governments were essential facilitators of workplace training for doctorate holders and should have initiatives to address structural issues that cannot be dealt with at an individual level (2009, p. 9). Its case studies indicated that government involvement led to sustainability and enhanced quality. Scholz (2011) considered that the role of government was to provide quality assurance through a framework of skills programmes and to evaluate outcomes through impact measurement (*e.g.* career tracking). While government may provide funding, researchers' motivation and engagement in training may be greater if they participate in the financing. The Leitch Review (2006) pointed to funding responsibilities for government with respect to basic skills and platform skills for employability. Governments may also play an important co-ordinating role to avoid unnecessary duplication and spur value for money. Governments might add value through support for central repositories of good practice. The ESF (2009, p. 46) suggested funding organisations could support the delivery of transferable skills training through partnerships at national and international level, and through exchange of good practices.

1.5.2. Individuals

Individuals are well placed to recognise their needs and organise their learning. The European Charter for Researchers (EC, 2005) and the United Kingdom's Concordat (2008) consider training a responsibility of researchers, who should engage in continuing professional development to update and expand their skills and competencies. Researchers' responsibilities include developing their ability to transfer and exploit knowledge, to commercialise research, to engage in critical thought, and to identify training needs and opportunities for learning. Respondents to a survey undertaken by the ESF (2009, p. 49) indicated that individual researchers played the most important role in procuring training. Their participation in funding it is also important as they gain from enhancing their competencies. Taking part in financing also increases the motivation to achieve and make the most of learning opportunities.

Nevertheless, individual researchers may have difficulty assessing which transferable skills are most in demand in given sectors or employers. The uncertainty that this creates shows the need for good access to information regarding employers in the different sectors, education and training providers, and researchers.

1.5.3. Other stakeholders

Universities, research institutes, industry employers and organisations such as research funding agencies and dedicated training organisations play a role in transferable skills training. Their potential responsibilities vary from indirect funding support to hands-on delivery of training.

In the United Kingdom, the Warry Report (2006) recommended that the research councils encourage universities to make enterprise training available to researchers in all disciplines in order to increase the impact of funding and support knowledge transfer activities. The Hodge Review considered that all funders of research should contribute financially, either directly or indirectly, to the skills and career development of PhD students and research staff (2010, p. 21). Earlier, the Roberts Review recommended that funding to higher education institutions be conditional on ensuring that postdoctoral researchers had career development plans and access to appropriate training opportunities (2002, p. 13).

Organising appropriate training can be a key responsibility. Respondents to a survey undertaken by the ESF (2009, p. 49) saw research organisations taking the lead role in skills training, particularly for management and delivery. In the United Kingdom's Concordat (2008), employers and funders are asked to recognise researchers' needs for transferable skills, delivered through embedded training, to help researchers stay competitive in internal and external job markets. A study of graduate education in the United States suggested that graduate schools should provide training, mentoring and information for non-academic career options and integrate workplace training needs into their graduate education programmes (Wendler *et al.*, 2010, p. 42). It considered that to be globally competitive, United States universities must develop professional education programmes that encourage creativity and entrepreneurship, personal effectiveness, project management, ethics and other skills that enhance research impact (p. 44). Mann and Marshall (2007) noted that Australia's CSIRO's extensive use of teams as a vehicle for research led it to invest heavily in team training and development.

Co-ordination of stakeholders can be crucial to good training outcomes. The Hodge Review (2010, p. 22) underlined the importance of routine interaction between research organisations and employers (or other stakeholders) when designing skills strategies and programmes, so that training activities are relevant. Otherwise, the focus of training would be unlikely to match the opportunities available to researchers. Along similar lines, Wendler *et al.* (2010, p. 46) called for employers to communicate the skills needed for jobs in the global economy.

1.6. Key points and open questions

The formation and careers of researchers are important policy issues and training for transferable skills is a challenge that attracts increased attention. Research careers are diversifying and researchers' skills needs are evolving. Studies of individual countries suggest that researchers follow a variety of career paths and move between sectors during their careers. To help meet career challenges, researchers need "transferable skills" such as communication skills and problem-solving abilities. The literature identifies transferable skills as important for researchers as they progress, particularly by giving them workplace-relevant competencies that pertain to a broad job market. Communication, team-working and networking, and business and management know-how are often mentioned; however, a wide range of generic skills are generally relevant, with potentially varying emphases across sectors. Transferable skills are receiving more attention, particularly in higher education programmes, and training opportunities are expanding.

However, identification of possible shortcomings in researchers' competencies and training opportunities has led to calls to reconsider current policy settings and approaches. By gathering government- and institution-level information on transferable skills training strategies and programmes this study provides details on a key input to researchers' transferable skill competencies. However, researchers' employment differs across sectors and countries, as does their mobility and level of qualifications. The precise challenges faced by countries therefore differ, with consequences for policy approaches.

The literature identifies several benefits of formal transferable skills training. Doctoral candidates, an important group of researchers, benefit from acquiring transferable skills during their studies. These help them succeed in their projects and in their later employment. While some skills are acquired while preparing the doctorate, formal approaches may provide more systematic and quality-consistent training to an increasing number of postgraduate researchers. They may also provide valuable opportunities to female and international students, and may foster positive attitudes to ongoing learning. Researchers in the workplace also benefit from ongoing acquisition of transferable skills to update and build on existing competencies or to "fill in gaps" so that they can work more effectively and take up different opportunities. Learning-by-doing on the job is an important channel; however, formal skills training can add value, as can learning through work placements and secondments. Surveys suggest researchers seek such opportunities for their career development.

Nevertheless, the literature leaves several important questions unanswered. Formal approaches to transferable skills training for PhD students are not uniformly welcomed, with some concerns about implications for core research, degree lengths and costs if more training is incorporated into PhD studies. There is also debate over the skills to be taught at different stages and the best way to learn them – interaction with supervisors and peers, formal courses, or workplace-based learning (*e.g.* during an internship). For researchers in the workplace, there are also questions about the mix of skills required and learning methods, and there is some evidence of unmet demand for formal "workplace experience" channels. The literature proposes that responsibility for training should be shared in light of the benefits received and the knowledge possessed by different stakeholders. However, governments have a range of potential roles, ranging from strategic oversight to funding to delivery; other stakeholders also play many potential roles. For policy-making purposes, a key question is whether there are market or system failures that government intervention in these areas might alleviate.

The following chapter begins to tackle these questions by presenting a sample of current approaches to transferable skills training by governments and institutions. By examining country-specific information on types of training, target audiences and skills, and stakeholder roles, it provides new insight on a key input to transferable skills training for researchers.

Notes

1 The ESF has since moved from the term "transferable skills" to "professional skills" in its work on research careers, to mark a change in focus from the academic sector (particularly, doctoral candidates and post-docs) to researchers more broadly (Scholz, 2011). This study uses "transferable skills" to encompass researchers in all sectors. Issues related to defining different groups of skills were discussed in previous work on skills for innovation and research (OECD, 2011).

2 The questionnaire was distributed by country delegates to the OECD's Research Institutions and Human Resources (RIHR) Working Party.

3 Definitions of the terms "post-doc" and "early-stage researcher" may differ among countries.

4 Another important influence, not discussed here, is the extent of researcher training abroad.

5 The figures in this section show the data available for OECD member countries and other major economies, where possible.

6 Chinese data do not correspond precisely to the *Frascati Manual* recommendations.

7 The study focused on those who earned their doctoral degrees between 1990 and 2006.

8 As a general caveat, while this study focuses on researchers with research careers, the literature does not always specify whether the population in question is in research or non-research work. Nevertheless, the literature results are indicative of the diverse career opportunities for researchers and, in any case, classification of occupations into "research" and "non-research" is not always clear-cut.

9 For example, in its research workforce strategy, Australia stated its aim to embed the development of transferable skills into university research training programmes to support researchers in a wide range of employment contexts (Commonwealth of Australia, 2011, p. 25). The Hodge Review (2010, p. 15) also favoured the development of generic skills embedded in research degree programmes and as part of normal staff development for research staff.

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