

Becoming a PI: Shifting from ‘doing’ to ‘managing’ research

Lynn McAlpine, University of Oxford

Lynn.mcalpine@learning.ox.ac.uk

Abstract

Achieving research independence by becoming a principal investigator (PI) is a key aspiration for many postdocs. Unfortunately, little is known of the postdoc trajectory from PhD graduation to first PI grant. This study addressed this gap by examining how researchers prepared for and dealt with this significant ‘leadership transition.’

Context

Research into the postdoctoral period is still quite limited in comparison with doctoral education (Evans, 2011), despite the postdoctoral period being increasingly viewed as a key step in achieving a pre-tenure position (Nir & Zilberstein-Levy, 2006). Further, in many instances the length of postdoctoral appointments is growing (Bonetta, 2011), so it is becoming more a career than a transition. Postdoctoral researchers view the period as one in which they develop their scholarly profiles and research independence (Akerlind, 2005), with becoming a principal investigator (PI) a key aspiration, sometimes characterised as a critical career transition point (Bazeley, 2003). A survey of postdoctoral supervisors suggests that two-thirds of them concur that the postdoc experience is one in which to develop independence, though only a third felt learning how to write grants and obtain funding was important to postdoc experience (Bonetta, 2011). Still, there has been little research into the trajectories of PhD graduates as they move into postdoctoral work and endeavour to get their first grant as PI. This UK-based study undertook to

address this gap by gaining an in-depth understanding of how those who had become PIs experienced preparing for and dealing with the significant ‘leadership transition’ to PI (Kolb et al., 2012).

Conceptual framework

This paper examines the experience of becoming a PI broadly within a workplace learning perspective premised on the notion that the workplace offers an environment in which to learn key elements of practice (Billett, 2002), but individuals choose the degree to which they participate, modify or refuse to participate in such work practices (Billett, 2006).

As regards academic work, a key shift for doctoral students (Gardner, 2008) and those who have graduated (Laudel & Glaser, 2008) is the development of an increasing sense of independence as a researcher. This can be characterized as the development of an identity-trajectory (McAlpine et al., 2013) which integrates a unique intellectual profile situated within and recognized by a growing network of local and international colleagues who also can provide support. In other words, in the academic workplace, it is the academic network globally, not just the institution in which an individual is working, that constitutes the ‘workplace’ in which individuals learn. Still, such extended support is not sufficient to advance one’s goals; also necessary is the ability to draw on institutional resources (McAlpine et al., 2013¹).

From the perspective of identity-trajectory, developing individual independence is demonstrated in agency: individuals articulating and working towards personally-chosen academic (as well as

¹ A key tenet of identity-trajectory is that work is embedded in and strongly influenced by personal relationships and responsibilities. In this study, however, the focus is on work, so individual’s personal lives are not explored.

personal) intentions and goals, and in doing so developing and drawing on the support of extended and local networks (McAlpine et al., 2013). An additional aspect of individual agency is dealing positively with expected as well as unexpected changes and challenges, particularly in the context of the academic rejection culture (Baruch & Hall, 2004). This ability to deal positively with challenges requires resilience, characterized here as the capacity to adapt successfully to, and to bounce back from, adverse circumstances. In other words, resilience encompasses a positive emotional response to stress – in which motivation, intention, the intellectual and the emotional are intertwined (e.g., Nardi, 2005). Day (2008) in referring to teachers describes resilience as contributing to enduring commitment which enables resistance to future negative events.

While the transition from postdoc to PI (Bazeley, 2003) has been characterized as a critical career transition, it has also been described as a significant ‘leadership transition’ (Kolb et al., 2012). Leadership can be understood in a range of ways. For the purposes of this study, I draw on work which engages the notions of agency, intellectual development and networking. Baruch and Hall (2004) note the importance of individual agency and resilience in managing the challenges associated with developing an academic profile and career. Further, leadership arises from engagement with influential colleagues within one's discipline, whether or not part of the institution (Bolden et al, 2012). Further, Bolden et al. (2012) note two aspects to necessary aspects of academic leadership, which sit alongside each other and are complementary:

- leadership which builds commitment, e.g., informal and interpersonal characteristics such as offer inspiration, represent exemplary intellectual standards, offer mentoring)

- management with an institutional focus to address formal issues related to responsibility for tasks and processes, e.g., financial and personnel issues.

Both processes inform the purposes and objectives academic staff have towards work.

Interestingly, individuals in the Bolden et al. (2012) study, UK academics with a range of experience and roles, reported the two aspects of leadership did not sit comfortably, particularly when institutional agendas stressed management accountability, e.g., alignment with institutional brand, market position and performance. Such an institutional stance narrows attention to targets and outputs and undermines academic leadership.

In looking specifically at PI perspectives, a UK survey² (Vitae, 2011) of PIs, some with considerable experience, provides some insight into the perceived abilities that might represent these two aspects of leadership. The survey reported that while most respondents were confident in their research abilities, fewer were confident in their leadership of people. Still, most saw leadership activities, such as supervision of doctoral students (95%), building a group (96%) and managing performance (90%) to be important. Respondents expressed the most confidence in a) supervising postgraduate students (84%), with much less confidence in b) building a research group (68%), c) motivating individuals (67%), and d) managing performance (51%) – a) to c) characterize what Bolden et al. (2012) refer to as academic leadership while d) represents academic management.

Respondents were also asked to rate the importance of a range of research-related activities in becoming effective research leaders. The four chosen from drop-down menus as very important by over 80% of all respondents represent a means of demonstrating independence and success as

² Note that the survey provided drop-down lists so responses were limited to the choices offered.

a researcher: developing a research area (99%), securing research funding (98%), maximising outputs (98%) and preparing research proposals (98%).

Objectives

The research asked two specific questions:

1. How do researchers experience working towards achieving the 'leadership transition' to PI?
2. What are the challenges faced by PIs as they transition from doing research under supervision to having autonomy to achieve their goals?

Methodology, participants, data collection and analysis

Methodology: The study draws on a narrative tradition with a focus on biographical stories. It is unusual in this tradition in looking across a number of individuals, rather than just one or two.

Narratives make connections between events, show the influence of the passage of time in carrying the action forward, and demonstrate the goals and intentions of individuals (Coulter & Smith 2009). The underlying premise is that narratives, whether oral or textual accounts of experience, represent constructions of identity (Riessman, 2008).

Recruitment: In two research-intensive universities, one in continental Europe and the other in the UK, participants were recruited via email. They were invited to respond if they self-defined as meeting the following criteria:

- In the last 5 years, you have been awarded grant funding in your own right and for the first time (not including personal fellowships)
- You are supervising others

- You have overall responsibility for the intellectual leadership and overall management of the research project.

Participants: This study analyses the experiences of 16 of these participants, all in the STEM fields: eight from each university: in the UK, Frances, Cathy, Juliet, Laura; Gregg, Geoff, Mike, and Pedro, and in Europe, Fiona, Dan, Sam, Victor, Fabien, Romeo, Will, and Jerry (all aliases). Using two different national contexts seemed important given the association between researcher mobility and career progression (Horta, 2009). Participants were interviewed in English at a location of their choice between December 2013 and June 2014. When interviewed, most were between 31 and 40, with five females and 11 males. At the UK university, about two-thirds did not have English as their first language and at the European university about half did not have the mother tongue of the country where they were employed.

Data collection: Given the intent to track post-hoc the journey from PhD graduation to the PI award, data collection involved an in-depth interview that incorporated the construction of a journey plot as a preliminary step. Journey plots, activity evolution graphs, are a visual data collection method well suited to capturing experiences and related emotions through time (Miller & Brimicombe, 2003) – and are thus particularly suitable for a narrative approach with its focus on agency, motivation and related emotion. The journey plot template showed the progress of time on the horizontal axis from left to right and the variation in related emotion from high to low on the vertical axis (top to bottom) – with the mid-point marked. Participants were asked to map the emotional highs and lows of their experiences from PhD graduation to their first PI grants. Immediately afterwards, in the interview, individuals were asked to re-construct the

journey expanding on the meaning and complexity of the different events and related high and low points. The combination of visual and dialogic information allowed us to grasp the chronology as well as a sense of the relevance of the emotional aspects of the experiences, essential to capturing possible relationships between intellectual intentions and emotions. Following this, individuals were asked to describe their experience of being a PI (daily activities, challenges, institutional support available, etc.) and finally any advice they would offer to individuals starting on a similar journey. After the interview, individuals completed a short biographic questionnaire and provided a CV. This study focuses principally on the first part of the interview, working towards achieving PI status, as well as aspects of the second part, the key challenges of being a PI.

Analysis: The data were analysed thematically in a manner common in narrative research which involves “keeping a story intact by theorizing from the case rather than from component themes across cases” (Riessman, 2008, p. 53). This is different from the thematic analysis common in other traditions of research where the findings are presented and organized first by theme rather than by individual. The first step was to reduce and still display the scope of the data for each individual. This was done by creating case summaries: reduced descriptions of each participant’s account remaining as close as possible to the participant’s own voice which integrated the interview, the journey plot, the biographic information and the CV.

This made it possible to understand the individual trajectories before looking across the cases seeking patterns of experience. As regards the journey plots in particular, it was possible to look

for patterns in emotional experiences by identifying the tempo (the speed at which changes occurred through time) and intensity (the emotional power) of each experience.

Results

The answers to the research questions are presented incorporating discussion.

1. How do researchers experience working towards achieving the 'leadership transition' to PI'?

Except for three individuals (Juliet, Jerry, Sam) who graduated around 2000 and got their first grants in the mid-to-late 2000s, the time period individuals were referencing in describing the journey from PhD graduation to achieving PI status began in the mid-2000s and flowed through the global economic crisis to 2012-2014, in both cases, covering a period of 5-7 years. The extent to which this time period may have influenced participant experiences is not evident though I suspect it did, given that an earlier study (Bonetta, 2009) reported 76% of post-docs lasting from one to three years and 19 percent four plus years – considerably shorter than the experiences represented here.

In the accounts about their journeys from PhD graduation to getting and taking on PI responsibility, five (Laura, Fabien, Romeo, Greg, Geoff) began their accounts with reference to their PhD work; in all cases, they described serious challenges they had experienced during the degree, such as re-direction of their research or institutional re-locations, sometimes to different countries. The remainder began their accounts with graduation.

Overall, individuals sought postdoc positions globally, so were prepared to move between different research-intensive universities in the US and the EU. Clearly, they demonstrated the mobility referred to by Horta (2009) and adaptability as they moved across institutions and national boundaries to advance their careers. Still, these geographical, institutional, linguistic and cultural re-locations involved shifts or changes in relation to space, place, situation, state, time, and affect – with physical, social, and psychological dimensions since they require adaptability and considerable personal investment (McAlpine, 2012). A few (e.g., Pedro, Fiona, Juliet) also experienced the challenge of networking and intellectual re-locations (McAlpine, 2012) when they moved outside of their specialisms, methodologies and research theme in joining new teams, which meant finding a way to contribute when they didn't share a common research perspective or discourse.

The results of these re-locations could be experienced positively and negatively, both as regards personal lives and work. In general, those who had spent time in the US often commented in positive ways about the academic and research climate there in relation to the more constrained one in the EU and particularly the UK (e.g., Will, better job prospects; Fiona, better work environment; Pedro, Jerry, Romeo and Laura, different research practices related to grant proposals and ethics; and Romeo and Geoff, better work-life balance). This finding echoes that reported in an earlier comparative study (Jones et al., 2012) of more experienced academics that those in the US are generally more satisfied with the work environment than those in other countries (except for Canada). Overall, changes in national jurisdiction which most experienced required dealing with new funding regimes and genres which individuals had to negotiate.

Further, such moves enabled comparisons, so individuals became much more aware of variation in institutional pressures and departmental politics.

During this time, individuals were working towards both gaining research funding and a position leading to permanence. As regards the former, they all shared a similar EU research context so had access to a common funding agency which offered a series of awards for early career researchers – defined as those within a certain number of years of graduation, e.g., Marie Curie. As well, each country had funding councils with funding for early career researchers, often including the terms ‘career development’ or ‘leadership’ or ‘starting grant.’ In nearly all cases, individuals were applying for both levels of grants. As well, both institutions also offered smaller amounts of money and in some cases fellowships to support research.

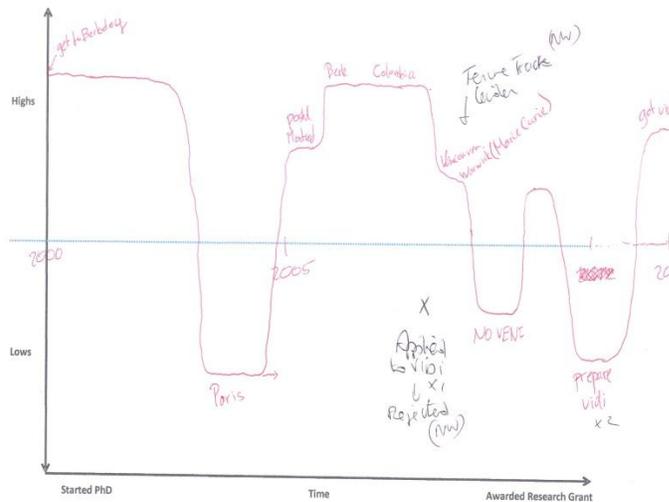
As regards writing grant proposals, individuals noted the challenge of learning the local/national proposal genres, and ensuring the proposal presented a unique and interesting focus that would capture the reviewers; this criterion is important to reviewers (Porter, 2005). Thus, they all described ways in which they sought to enhance their chances of success. This involved actively seeking feedback on the proposal from their developing networks both institutional and external, with individual practices differing. Strategies they used included discussion regarding the research goal (e.g., Juliet), to feedback from specialist peers (most), to feedback from non-specialist researchers to emulate potential reviewers (e.g., Will, Fiona). As well, when the proposal process involved two rounds, then arranging for mock interview feedback came into play (e.g., Mike, Pedro, Dan). Despite their efforts, a “problem that is recurrent ... [is] that you never know what ...people judge you on [so getting a grant involved] ...having a good angel.”

(Sam). In fact, given the difficulties of getting grants (Porter, 2005), more than half invoked some form of 'luck' (or 'bad luck') for their (lack of) success; this was likely also a way of mediating the competition between themselves and their colleagues.

In looking at their journeys in terms of the emotional experiences, the findings provide a sense of the integration of emotion and work-related activities as well as the importance of resilience in dealing with lack of success. Often PhD graduation was experienced as a positive experience with a dip shortly afterwards experienced by about half when individuals began to deal with the challenges of the journey ahead. In addition to graduation, the highs referred to, for instance, getting a grant (e.g., Romeo), having a paper accepted in a good journal (e.g., Greg), finding a productive group/environment (e.g., Mike), and getting enough results to be able to apply for a grant (e.g., Juliet). The lows referred, for instance, to seeking a new direction post-graduation (e.g., Victor), having a proposal rejected (e.g., Cathy), job-seeking (e.g., Victor), time it takes to write a proposal with no guarantee of success (e.g., Romeo). Other low points included geographical, cultural and linguistic re-locations (e.g., Will and Fiona, difficult re-adaptation to the EU after US experience) as well as issues related to their personal lives (e.g., Frances, navigating work and childcare).

In looking across the fifteen journey plots (Sam listed events but did not plot the highs and lows), there was one prevailing pattern evident in half the individuals: multiple highs and lows above and below the mid-point with the final point an upward one (Geoff, Laura, Mike, Dan, Romeo, Fabien, Victor); in other words, the pattern was one of relatively high tempo (speed of change) and high intensity (emotional power of experiences).

Figure 1. Romeo's journey plot



A striking pattern shared by two, Jerry and Fiona, was a journey of medium tempo and low-to-medium intensity but still overall emotionally downward, beginning above the mid-point but gradually dropping below or to the mid-point.

Other patterns were:

- For three, a consistent upward trend (with low tempo) with very small dips (low intensity): Frances, Peter, and Greg, with Frances and Pedro beginning and remaining above the emotional mid-point
- For two, a number of ups and downs (relatively low tempo) remaining around the mid-point (low intensity), so not demonstrating the extremes of emotions in the majority group: Juliet and Will

- Cathy's plot was unusual in that while she experienced high intensity, the tempo was extremely low.

These individuals' ability to recognize and describe their emotional responses to specific instances of their efforts to be successful in academic work demonstrates the intertwined nature of motivation, intention, emotion and intellectual thought (Nardi, 2005). It is a reminder that while emotion is often overlooked in higher education, it is essential to understanding sustained commitment to work (Neumann, 2006).

Overall, during this period, individuals demonstrated their agency by expressing clear goals they were working towards, sometimes on their own and often with the help of others as they called on a developing inter-personal network both local (department, institutional) and extended (McAlpine et al., 2013). Individuals said things like: "believe in yourself," "know where you're going," and "have a vision." They were seeking to develop and advance their unique intellectual profile. Individuals referred to this work as developing (or deviating from) a research direction that, while related, was distinct from the PhD – and making this direction evident in publications. A few described what they were doing as somewhat of a risk, though necessary, in order to be attractive to grant funders. Their focus on a unique research direction and evidence of it in publications reflects the research activities that PIs in the Vitae (2011) survey viewed as important in becoming effective research leaders. Lastly, since achieving their goals often included dealing with sustained challenges, unexpected as well as expected, as well as negative emotions, I would suggest they demonstrated resilience, the ability to bounce back from difficulties, which Baruch & Hall (2004) describe as essential to academic success. The only

individuals where such resilience might be in doubt are Jerry and Fiona whose emotional trend was slowly downwards.

2. *What are the challenges faced by PIs as they transition doing research under supervision to having autonomy to achieve their goals?*

Becoming a PI was experienced as a critical transition point as suggested by Bazeley (2003). What was striking was that individuals seemed surprised at how dramatically the transition influenced the nature of their work and responsibilities; in fact, it appeared that they had given little thought to the new role. This parallels earlier research about PhD students who generally were so focused on completing the degree, that they had given little thought to the post-graduation period (McAlpine & Turner, 2012).

While most individuals had a sense of how to do research and motivate others, they had never managed people before and noted challenges such as: choosing students and postdocs extremely carefully; monitoring and managing progress/ lack of progress, and stepping in when there were performance issues. Though training was sometimes available, this was not necessarily viewed as helpful. (On the other hand, a number commented positively on the support they received for managing the financial administrative aspects of the grant.) These consistent findings across all individuals resonate with the Vitae (2011) survey and confirm the nature of the challenges of being a PI.

Thus, though getting the grant was a positive experience, having it meant not doing “what I thought I would be doing” (Juliet). Individuals found themselves dealing with a new set of challenges which many characterized as a shift in perspective from ‘doing’ to ‘managing’ research – “become a manager” (Sam). All but Romeo and Will described a range of responsibilities they had to take on: managing the grant (Jerry), dealing with people (e.g., Frances, Fiona), managing the team (e.g., Pedro, Fabien, Jerry), line managing individuals (e.g., Laura, Cathy) as well as setting priorities amongst tasks (e.g., Mike), negotiating the ‘political’ environment (e.g., Fabien), developing a management style (e.g., Greg, Geoff, Victor), getting people to do things they don’t want to do (e.g., Dan). These tasks and responsibilities clearly reflect the leadership and management tasks listed in the Vitae (2011) study.

Their attention to managing students and the group can be seen as a form of academic leadership. Bolden et al. (2012) have noted that this type of leadership means being seen to be working on behalf of the group, helping frame group identity, and putting structures and processes in place to further group interests. This form of leadership, though unrecognized by these individuals as such, was viewed in a positive light since it built and promoted each researcher’s scholarly identity, despite each still learning how to carry out these responsibilities. On the other hand, individuals viewed somewhat negatively academic management, like those in Bolden et al.’s (2012) study: issues related to institutional tasks and processes (e.g., administrative and financial accounting).

Interestingly, a number commented that they could not sit back after getting their first grant as they perceived the need to continue to apply in a cyclical process. Pedro commented that he

needed to “use it to accelerate more.” And Juliet commented: “in order to get money, I need to do good research and have good ideas ... So, money is a big concern, research is a big concern, and at this point, they just kind of just mingle together.”

Overall, it appeared that while all viewed becoming a PI as an important and positive step, the aftermath of gaining it involved new challenges (ones they had not been trained for), and there was a variable response to this shift. Many commented on feeling somewhat disappointed that they were becoming distanced from the personal investment that had led them to become researchers. And there were some concerns that success would lead to larger and larger teams. This was the situation with the two whose emotional journeys went steadily downwards over time: for Jerry, the team becoming too big and for Fiona, too complex given inter-disciplinarity to manage. Still, a few also relished the opportunity to manage research, seeing it as a way to extend their profiles.

These findings raise interesting issues related to the characterization of moving from a postdoc to PI role as a significant ‘leadership transition’ (Kolb et al., 2012). While these individuals clearly experienced the new role as a transition, it was not evident that they thought of the PI role as that of a leader. As was noted above, their focus was ‘managing’ – perhaps best described as learning to deal with – different new and unexpected tasks and responsibilities. And, it was evident that they demonstrated agency and resilience in handling the new challenges and, aside from Fiona and Jerry, perceived themselves on emotionally upward journeys, in which they were learning to successfully handle their new responsibilities.

An unexpected finding emerging from the analysis was the conceptions held by these individuals of the role of PI. The reader may recall that individuals were recruited who self-defined as

- having been awarded grant funding in your own right and for the first time (not including personal fellowships);
- supervising others; and
- having overall responsibility for the intellectual leadership and management of the research project.

Many of the grants that individuals characterized as their first PI grant were special financial awards to support early career researchers, offered by the EU funding council, and the councils of both countries. Individuals knew about and were being directed towards these to advance their research trajectories. Such awards were often called fellowships, e.g., Marie Curie Fellowship, UK NIHR Career Development Fellowship, and EPSRC Leadership Grant. This type of funding is limited to a certain period of time after PhD graduation, is to support those who have made a commitment to research and *show potential*. From the perspective of the funding council, the award is an investment in the future and is generally to cover salary and in some cases one support position for a number of years. The fact that individuals considered themselves PIs even when holding fellowships rather than grants suggests two things: a) their notion of being a PI focused on being the named researcher and having intellectual leadership for the research (and perhaps supervision) rather than the type of award; and b) the use of the term, fellowship, may be expanding given that increasingly individuals are expecting and are expected to hold a series of fellowships each with greater expectations of research potential before getting their first grant competing against all researchers, regardless of experience.

A second point of interest was the institutional roles individuals held in becoming what they characterized as a PI. There was, in fact, a relatively even distribution of types of institutional roles:

- Six (Fabien, Geoff, Dan, Sam, Frances, Romeo) were postdocs when they obtained funding of some kind and then went on to tenure-track positions: Fabien received national and institutional ECR funding which meant he could start his own group; he then moved into an associate professor role with a new national grant; Geoff was awarded a national career development fellowship and then become a lecturer in the same university; Dan was successful the second time in getting a national ECR grant and then went on to a pre-tenure post, again with a new grant; Sam, Frances and Romeo followed similar trajectories
- Four (Will, Greg, Cathy, Mike) obtained fellowships of some kind and were still postdocs at the time of interview
- Four (Juliet, Pedro, Victor, Romeo, Laura) obtained lectureships and then grants: Juliet, got a lectureship before getting a standard grant; she noted that it was easier in her field to follow this trajectory than in some other fields; Pedro, Victor and Jerry followed similar trajectories
- One (Fiona) was awarded a career development fellowship and characterized her institutional role as both researcher and assistant professor
- One (Laura) was hired as research faculty (not lecturer) through a core grant-funded position and then was awarded a career development fellowship; such core funding may be particular to medicine in the UK.

Thus, there appeared no clear pattern linking institutional role and attainment of first PI grant. It may be that the traditional pattern of obtaining a pre-tenure position and then seeking a grant is becoming much less common – at least in the sciences.

Overall, the accounts of PI transition reinforce the importance of agency, resilience and commitment demonstrated during the postdoc period. There is a continuing need to be self-guided and motivated, to invest in oneself and to be agile and adaptable in moving one's career and research agenda forward (Baruch & Hall (2004). For these individuals, investing in developing academic leadership abilities and vision as well as academic management skills will support their efforts to establish themselves as well-recognized international researchers.

Significance

Achieving research independence by becoming a PI is a key aspiration for early career researchers and can be characterised as a critical career transition point (Bazeley, 2003). What is clear from this study is that these PhD graduates appeared committed to continue relatively lengthy periods of postdoctoral work in a range of institutions (often involving international mobility) to achieve their twin goals of obtaining their first grant as well as a pre-tenure position. While all had obtained the first goal, a number had not yet achieved the second. It is clear that in the academic arena, we are extending the learning period before obtaining a 'career' tenure-track position, (Schuster, 2009). Unfortunately, I would argue that research education has not kept pace with these changes. In other words, research education has largely been conceived as occurring at the master's and PhD levels, with the body of scholarship devoted to understanding the development of post-PhD researchers minimal. More research of the kind in this study might broaden our perspective of research education to encompass the 10-year period from the start of the PhD (EU definition). Such a re-conceptualization could lead to better support for individuals such as those in this study.

References

- Akerlind, G. (2005). Postdoctoral researchers: roles, functions and career prospects. *Higher Education Research & Development*, 24(1), 21-40.
- Baruch, Y., & Hall, D. (2004). The academic career: A model for future careers in other sectors? *Journal of Vocational Behavior*, 64, 241-262.
- Bazeley, P. (2003). Defining 'early career' in research. *Higher Education*, 45(3), 257-279.
- Billet, S. (2002). Workplace Pedagogic Practices: Co-Participation and Learning. *British Journal of Educational Studies*, 50(4), 457-481
- Billett, S. (2006). Relational interdependence between social and individual agency in work and working life. *Mind, Culture and Activity*, 13(1), 53-69.
- Bolden, R., Gosling, J., O'Brien, A., Peters, K., Ryan, M., & Haslam, A. (2012). *Academic leadership: Changing conceptions, identities and experiences in UK higher education*. London: Leadership Foundation for Higher Education.
- Bonetta, L. (2009). The Evolving Postdoctoral Experience. *Science Careers from the journal Science*.
- Bonetta, L. (August 26, 2011). Postdocs: Striving for Success in a Tough Economy. *Science Careers from the journal Science*.
- Day, C. (2008). Committed for life? Variation in teachers' work, lives and effectiveness. *Journal of Educational Change*, 9, 243-260.
- Coulter, C., & Smith, M. (2009). The construction zone: Literary elements in narrative research. *Educational Researcher*, 38(8), 577-590.

- Eraut, M. (2004). Informal learning in the workplace. *Studies in Continuing Education*, 26(2), 247-272.
- Evans, L. (2011). The scholarship of researcher development: Mapping the terrain and pushing back boundaries. *International Journal for Researcher Development*, 2(2), 75-98.
- Horta, H. (2009). Holding a post-doctoral position before becoming a faculty member: Does it bring benefits for the scholarly enterprise? *Higher Education*, 58, 689-721.
- Kolb, Klappstein and Tonner (2012). "The 15 things that surprised me most when I started out as an independent group leader", *Journal of Postdoctoral Affairs*, Vol.2, No 2.
- Jones, G., Weinrib, J., Scott Metcalfe, A., Fisher, D., Rubenson, K. & Snee, I. . (2012). Academic work in Canada: The perceptions of early-career academics. *Higher Education Quarterly*, 66(2), 189-206.
- Laudel, G., & Glaser, J. (2008). From apprentice to colleague: The metamorphosis of early career researchers. *Higher Education*, 55, 387-406.
- McAlpine, L. (2012). Academic work and careers: Re-location, Re-location, Re-location. *Higher Education Quarterly*, 66, 2, 174-188.
- McAlpine, L., Amundsen, C., & Turner, G. (2013). Identity-trajectory: Reframing early career academic experience. *British Educational Research Journal*. doi: 10.1002/berj.3123
- McAlpine, L., & Turner, G. (2012). Imagined and emerging career patterns: Perceptions of doctoral students and research staff. *Journal of Further and Higher Education*. 6, 4, 535-548.
- Miller, N., & Brimicombe, A. (2003). Mapping research journeys across complex terrain with heavy baggage. *Studies in Continuing Education*, 26 (3), pp. 405-417.
- Nardi, B. (2005). Objects of desire: Power and passion in collaborative activity. *Mind, Culture and Activity*, 12(1), 37-51.

- Neumann, A. (2006). Professing passion: Emotion in scholarship of professors at research universities. *American Educational Research Journal*, 43(3), 381-424.
- Nir, A., & Zilberstein-Levy, R. (2006). Planning for academic excellence: Tenure and professional considerations. *Studies in Higher Education*, 31(5), 537-554.
- Porter, R. (2005). What do grant reviewers really want, anyway? *The Journal of Research Administration*, 36(2), 47-55.
- Riessman, C. (2008). *Narrative Methods for the Human Sciences*. London, UK: Sage.
- Tynjala, P. (2008). Perspectives into learning at the workplace. *Educational Research Review*, 3(2), 130-154.
- VITAE. (2011). *Principal Investigators and Research Leaders Survey*. London, UK.

