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**Doctoral Competencies and
Graduate Research Education:
Focus and Fit with the Knowledge
Economy?**

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Doctoral Competencies and Graduate Research Education: Focus and Fit with the Knowledge Economy?



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ABSTRACT

The paper considers the evidence on the types of skills and abilities that are needed by doctoral students. In particular, it examines whether doctoral competencies can be differentiated from general undergraduate/postgraduate-level competencies and whether employers value the skills and abilities that doctoral graduates bring to work organisations. Surprisingly, given the cost of fourth level education, there is a dearth of existing work regarding graduate and doctoral students' experiences (Cryer, 1997). In addition, where lists of doctoral competencies are proposed, there is little evidence of a theoretical or empirical basis for the choice of these competencies, and the lists appear to have emerged through a process of speculation, or the prior experience of students and faculty, rather than through any coherent analysis. Many commentators (Allen, 2002; Park, 2005; Mitchell, 2007) consider that PhD and other doctoral programmes must adapt and become more flexible, as students' requirements and preferences change and that the personal skills and attributes that a doctoral student possesses are as important as any specialist knowledge or skills. The paper suggests that current conceptualisations of doctoral competencies are inadequate and puts forward a model to reframe the way in which these competencies are understood and labelled. The paper has implications for the education and training of doctoral students and for the graduate research education programmes (GREPS) that are emerging as part of the reconceptualisation of graduate education.

Key Words: Doctoral Competencies; Education and Training; Knowledge Economy

INTRODUCTION

There is a large body of literature that has identified the skills and attributes that PhD students should, in theory, either possess prior to undertaking their course of study, or develop throughout the experience of acquiring their doctorates. Typically, emphasis is placed on the graduates' ability to communicate their value and worth effectively to potential employers. However, there is a dearth of empirical evidence regarding graduate and doctoral students' actual experiences (Cryer, 1997), and there appears to be little evidence of a theoretical or empirical basis for the typical competencies associated with doctoral level learning outcomes. Many of the competency lists appear to have emerged merely from speculation on the part of different interested groups such as employers, or the faculty involved in the process and occasionally from past student personal perceptions of what they developed. Little dedicated rigorous learning outcome or competency development research has been conducted.

This paper first reviews the evidence that exists regarding skill and competence development of doctoral graduates. This evidence is compared with the expectations of key players in the process such as University faculty and employers expectations of doctoral level graduates. The paper then progresses to critique the menu led competence development model that currently pervades and suggests that our approach to doctoral competence portfolio development should be more structured and planned with a guiding developmental model to support such evolution.

THE CHANGING NATURE PERCEPTION OF THE PHD

The PhD is rooted in the birth of the European university system in the thirteenth century, when a doctorate was considered a licence to teach, rather than a recognition of research expertise or achievements. Interestingly, Park (2005) relates that the first modern 'research university' was founded in Berlin in 1810 where, the award of a doctorate required attendance at seminars, submission of a thesis, and the passing of an oral examination. Within the British and Irish University system the PhD evolved to become an apprentice process where the student was typically attached to one supervisor/mentor within one institution and focused on a specialised research programme leading to the delivery of doctoral thesis which would be completed within a 3 year cycle. This thesis is reviewed by a noted peer and an oral defence completed the PhD process.

This approach is in marked contrast the extant model developed in the United States. Within the US there has been a convergence to a formally structured educational model which involves dedicated modular advancement before an empirical research project is embarked upon. This formal doctoral programme model with significant taught components, when compared with the euro-apprentice model, indicates a shift in the central objective of the PhD process. The traditional euro-centric PhD objective as characterised by Park, (2005) was the production of "a piece of work that changes the course of human knowledge" (p.104). However, there is a shift occurring in the perception of the role and utility of doctoral education.

In Salzburg in February 2005, The European University Association agreed a definition and description of doctoral education which has become known as the Salzburg declaration. Contained within the report is the following agreed statement:

Doctoral education's core component, is the advancement of knowledge through original research. At the same time, it is recognised that doctoral training must increasingly meet the needs of an employment market that is wider than academia. (EUA, 2005:2)

Inherent in this conceptualisation is the admittance that the contemporary PhD is no longer to be regarded as the necessary training and gateway to a career in academia alone but must involve a knowledge and skill development experience that has relevance and application to wider industry. Thus the focus has almost imperceptibly shifted from the PhD as product with a focus on content to the PhD as a process or step in the training of a researcher where the focus is on competencies developed (Park, 2005).

Leonard (2000) suggests that recent developments in doctoral education are in fact harmful to academia in general. Her article examines the effects of attempts to make doctoral studies in the UK more efficient. She states that the PhD is ultimately a form of professional training as it is used as a gateway either to academic posts, or perhaps to jobs in industry sectors concerned with the production of new knowledge. Most work regarding professional education tends to focus on the 'professional', rather than the 'academic' areas, even though "knowledge and the ability to use and develop academic theories" (p186) are regarded as the academic's professional tools. She argues that focussing on professional development, with additional pressures to complete and publish 'on time', is to the detriment of both academic professional skills, and the PhD's overall contribution to new knowledge creation.

The argument for more involved and programme structured approach to PhD education suggests that there is a significant difference in the skill and competency portfolio developed by students that pursue a doctorate by apprentice versus a doctorate via a formalised programme.

THE IRISH CONTEXT

As part of the ongoing strategy to position Ireland as a leading innovative economy, Irish universities have committed to doubling the number of PhD graduates between 2005 and 2013 (Table 1). It is expected that these researchers will develop the skills, abilities and competencies to prepare them to be leaders in the development of Ireland's future knowledge economy success.

[Insert table 1 about here]

In conjunction with these projections there is a clear strategy of moving from the traditional apprenticeship model of doctoral training to a more programmatic

approach. This development is clearly articulated in the Irish Universities Association future strategy and is an explicit goal of the Strategic Innovation Funded (SIF) drive for advanced fourth level development. The proposed shift is characterised by the following comparison which attempts to map the proposed shift (Source: IUA Website, 2008).

Some of the features of the “traditional” PhD model

- Student enrolls with a research supervisor to embark on research, which depending on circumstances takes three to eight years to complete.
- No formal training in wider career management and transferable skills.

Features of the new and improved PhD model under 4th Level Ireland

- Formalised career development and where relevant work placement experience
- Doctoral supervisory teams to support students’ thesis research and their skills development needs.
- Opportunity to pursue skills development training that will develop students’ career and project management skills, ensuring they make a successful transition to their career of choice.
- Opportunity for students to pursue instruction in wider research methodologies increasing their research skills and making them more likely to work in interdisciplinary research within or outside academia.

This outline clearly indicates that the perceived outcome of a programmatic doctoral experience would be superior and more transferable to the traditional apprenticeship model. While there is overt reference to a greater diversity of skills and competencies there is little clarity regarding the exact nature of these expected outcomes and exactly how they might be related to future knowledge leadership. This lacuna requires urgent attention as it would be both naïve and unprofessional to design and implement graduate education programmes without first understanding explicitly what outcomes these programmes hope to deliver. The following sections focus on the extant research on doctoral competencies and the more involved research on the nature and development of competencies.

DOCTORAL SKILLS AND COMPETENCIES

There is a large body of literature that has identified the skills and attributes that PhD students should, in theory, either possess prior to undertaking their course of study, or develop throughout the experience of acquiring their doctorates. However, given the dearth of existing work regarding graduate and doctoral students’ experiences (Cryer, 1997), there appears to be little evidence of a theoretical or empirical basis for the choice of these competencies, with many lists appearing to have emerged merely from speculation, or the prior experience of students and faculty with questionable validity.

Cryer (1997: 208) lamented the dearth of existing work regarding graduate and doctoral student's experiences, in a report based on a year-long study initiated by University College London (UCL). This study documented the experiences of MPhil and PhD students in five departments, each comprising between 30 and 50 respondents. The study utilised action research with the aim of improving practice and found that few initiatives had been implemented by universities and other institutions to help students identify and develop key transferable skills. Cryer states that universities have a responsibility to help doctoral graduates to become aware of the skills that they can offer to employers above and beyond those of holders of degrees and Master's degrees. The study found that students were largely unable to identify and discuss their key skills and attributes. This suggests that communicating and presenting these skills to employers, along with developing a habit of lifelong learning, is something with which institutions should be helping and encouraging their doctoral students.

In a US-based study Golde & Dore (2001) conducted a survey on Doctoral Education and Career Preparation involving students in 11 arts and sciences disciplines from 27 universities and one cross-institutional programme. The survey was administered to a sample of 4,114 doctoral students in their third year and above, with a 42.3% response rate. The study examined the motivations behind students' reasons for choosing to pursue a PhD, the temporal and monetary considerations involved for them, and the career choices available and availed of by them. Although the report makes no attempt to list the skills that PhDs should possess, it does state that the scope of degrees should be broadened, and that students should feel that they are able to pursue a variety of careers. According to the report, most arts and sciences doctoral students are interested in pursuing faculty careers (89 per cent of philosophy students, for example), and that 82 per cent of the students surveyed are interested in or enjoy teaching. However, the research shows that there is an inadequate supply in all disciplines of faculty jobs available to meet the requirements of the increasing number of post doctorates seeking such posts, and that post doctorates have received inadequate training for other jobs in industry. Programmes offered as part of the PhD experience emphasise training in research and research methods, to the detriment of other skills that could be deemed more transferable across a number of job and industry types. Seventy-one per cent of the students surveyed were confident in their abilities to conduct research, but with only half as many equally confident in their abilities to publish their research – a vital element of the process. This indicates a lack of comprehensiveness in the training received by PhD students. The report also concludes that the training received by doctoral students is not always the training they want, nor does it prepare them adequately for the jobs they want, or those jobs to which they may need to 'resort' in the absence of a sufficient number of faculty posts. Thus, it appears that such programmes emphasise training in research, to the detriment of other skills, meaning that students are primarily prepared to become faculty members, regardless of whether there are enough posts to meet this demand.

However, the report also recommends that improved teaching skills training is a must; these are important for all PhD recipients, regardless of their discipline or future career choices. This is because the synthesising and explaining of diverse and complex materials is always a challenge, and an ability to do so is an asset in any setting or profession. This view is supported by Mitchell (2007) who reviewed works by the Association to Advance Collegiate Schools of Business (AACSB) and the Association of American Colleges and Universities (AACSU). He states that, until the 1990s, securing academic posts relied on one's publication record, and that teaching skills, while desirable, were not deemed essential. Now, however, doctoral graduates must demonstrate teaching ability, with the teaching of a class perhaps included as part of the selection process for faculty staff.

The Golde & Dore (2001) report places an emphasis on conducting research and communicating the results as a key skill, stating that students should be well-versed in accepted methods of collecting and analysing data in a given field, capable of reporting findings accurately, and able to advance knowledge in a given field. These require new ways of thinking, as disciplinary boundaries shift and merge. Students are also expected to uphold the norms and traditions of their respective professions, and to conduct themselves responsibly and ethically. The academic profession depends on self-regulation and responsible practice, which presumably are (or should be), passed on as an integral part of the mentor or supervisor and student relationship (Golde & Dore, 2001: 14). Citing examples from various sources including written policy and advisors, the report states that faculty and other academics can be confronted with many complex ethical situations. They must know how to work with students and staff and avoid conflicts of interest; they must avoid romantic entanglements; allocate credit for authorship and review papers fairly; create and handle data responsibly, with particular attention to copyrighted materials; use research funds appropriately; and follow principles for suitable treatment of animal and / or human subjects. The report concludes that training in such ethical practices is not always, as is often assumed, part of graduate skills training.

The lack of a standardised vocabulary hampers attempts to discuss postgraduates' experiences (Delamont *et al.*, 1997). In Australia, Borthwick & Wissler (2003) compiled a report on a study commissioned by the Department of Education, Science and Training, under its Research Evaluation Programme. It was based on the results of a questionnaire sent to respondents at 34 Australian universities. The authors comment on the proliferation of various terms in use to describe the skills of graduates, which often have a direct relation to the workplace. They highlight the variation in the terms used, stating that misunderstandings of these terms may inhibit the employability of postgraduate students, and that training in what they term 'generic capabilities', i.e. more transferable skills, should be incorporated into programmes. They state that "a descriptor such as generic, core, transferable, employability, graduate or personal may be attached to abilities, attributes, qualities or competencies, each of which carries different overtones relating to skill or

performance” (p15). In addition, generic skills that relate to the successful completion of a research project are not far removed from those required in the research workplace environment, or other employments.

Cryer (1997) did deliver an effort at mapping the competencies and skills developed over the course of the traditional PhD. In particular the focus is on the transferable skills developed rather than the more specific research area specific knowledge and skills (Table 2).

[Insert Table 2 about here]

Additional transferable skills may depend on the discipline and could include advanced computer literacy, familiarity with the Internet, the ability to teach effectively, to negotiate access to resources, to network with others, to use project management techniques, and to find information from specialist libraries or archives.

All PhD graduates who are adequately able and properly supervised should be able to claim skills in the specialist research-related aspects of their PhD topic. The extent to which these skills are ‘transferable’ to employment will depend on the nature of the PhD work and of the requirements of the employment. In addition, there are numerous skills which are more transferable, which employers would understand and value, and which it is reasonable to expect from PhD (and possibly MPhil) graduates, over and above the transferable skills which may have received more attention at undergraduate level. The crucial point about these additional skills is that they should develop naturally, as an integral part of the research degree process, without needing extra work or time on the part of students or staff. PhD students who are aware of these skills and who can make a case in non-technical language for having acquired them should have a competitive edge with employers over less reflective students with identical qualifications in related specialisations. Furthermore, in jobs outside their specialist areas, these students should be able to attract higher salaries than applicants with lower qualifications. Cryer’s work cites and follows on from empirical work carried out by the Association of Graduate Recruiters (1995, p21), which specified the need for postgraduates to become aware of their own specialist skills, their self-reliance, their team skills and their generalist skills. The Association recommended that graduates be able to identify these skills, and note them in a personal portfolio which can be presented to potential employers, yet this study similarly found that graduates were unable to identify these skills for themselves. Similarly, Morgavi *et al* (2007) found that doctoral researchers tend to be unable to articulate their personal skills, and to speak to employers in ‘their’ language. Commercial awareness and transition to employment remains an issue, along with the need to “bridge the communications gap between employers and researchers” (p10).

Morgavi, et al., (2007) work helps deconstruct the variety and extent of potential skills and competencies that might be expected of the typical doctoral graduate (see

Table 3 for outline comparison). However, the competency bundles identified are still merely a focussed menu and lack a theoretical foundation in terms of evolution

and development. To push beyond the “list formula” of doctoral learning outcomes researchers and educationalist involved in doctoral education and planning require a deeper understanding of the development of competencies and the complex interrelationship between ability, training, action, experience and reflection over the period of the academic apprenticeship.

[Insert table 3 about here]

THE NATURE OF COMPETENCIES

Research contends that competencies are not developed in a random ad hoc manner but tend to be accrued in a quasi hierarchical fashion over time (e.g. Pedler et al., 2007; Buckley and Monks, 2008). A clearer explanation of what is meant by ‘a competency’ is required before the nature of competencies, and in particular those related to third and fourth level education, are reviewed.

Competencies are complex and dynamically interactive clusters of integrated knowledge of concepts and procedures; skills and abilities; behaviours and strategies; attitudes, beliefs, and values; dispositions and personal characteristics; self-perceptions; and motivations that enable a person to execute a professional activity with myriad potential outcomes (Rubin et al., 2007:453)

More cogently, competencies are what Boyatzis (1982) describes as “the underlying characteristics of a person that lead to or cause effective and outstanding performance” (p21). Hall (1986) participated in the early debate on meta-skills or higher order skills for postgraduate and doctoral students, highlighting their necessity in facilitating ongoing professional development, stating that they underpin and reinforce all other qualities of successful practice. Later, Brown & McCartney (1995) added that higher order skills are those upon which competencies are based; these higher order skills being the ability to learn, adapt, anticipate and create, rather than simply demonstrate one’s current abilities. They use the examples of developing a proposal, collecting data, making a logical argument, applying knowledge and communicating ideas. They state that these higher order skills “exist above and beyond any competency which an individual may develop, guiding and sustaining them, and from which they (the competencies) originate” (p48).

Development of higher order executive metacompetencies requires more than training or education. Butcher *et al* (1997) produced a report based on a study of Cranfield University’s management development programmes. They report that sufficient challenge is necessary; gaining self-insights and ‘unlearning’ old habits. This is described as a process of “personal transition which can include painful and confusing phases before clarity, confidence and new skills are achieved” (p2). This requires the acquisition of knowledge about one’s self, through making inferences from direct behavioural feedback (mostly in the form of self-report questionnaires and

interviews, involving 267 managers across four programmes, over an 18 month period). The meta-abilities (or competencies, in addition to managerial knowledge and influencing skills), as described by Butcher *et al*, are:

- Cognitive skills: the key thought processes required to ‘read’ situations and which can be used to understand and resolve problems or issues (e.g. ‘paradoxical thinking’), and include: Cognitive complexity – the ability to take multiple and integrated perspectives, to recognise and hold conflicting concepts in mind; Cognitive flexibility – the ability to shift perspectives, remain open-minded and consider possibilities; Visionary abilities – the ability to think with a long-term perspective, envisage a strategic direction; Clarity achievement – the ability to use information effectively, sort, prioritise and analyse data; Perceptual acuity – the ability to notice and interpret what is happening in interpersonal interactions
- Self-knowledge: self-awareness and awareness of one’s impact on others.
- Emotional resilience: Self-control and self-discipline; the ability to manage emotions appropriately; Personal resilience; the ability to cope with pressure and adversity, ‘bounce back’; the ability to view one’s self both positively and critically, ideally and realistically
- Personal drive: motivation and ambition for responsibility – the ability to motivate one’s self and others, take personal risks.

Irish evidence of meta-competency or meta-quality development in postgraduate education also suggests that these higher order skills develop from a complex interaction of personal development insights with openness to new approaches to thinking and doing and the opportunity to test new skills and approaches in applied setting (Buckley & Monks, 2004, 2008). These findings suggest that competency development is not a purely intellectual developmental process but requires supported action and reflection to aid coherent development.

Although various lists of required skills and competencies have emerged, through national narratives within institutions and various sources of literature, Drummond *et al* (1998), attempt to define these skills have resulted in “a plethora of superficially similar, but often significantly different, lists” (p 20). This reflects varying interpretations, of not only what the lists should comprise, but also regarding the meanings of the individual competencies mentioned. The result, they state, is that “there are very few examples of actual practice where programmes for (development of transferable skills) correspond closely with the situation defined by established models of good practice”, despite considerable investment in curriculum development (p22). Drummond *et al* (1998), commenting on the proliferation of lists of required competencies, emphasise that a number of sources place central significance on graduates’ abilities to be positive and self-reliant, and that these personal qualities are as important as specific skills in a competitive labour market. This necessitates any programme of study having some form of structured and coherent programme for the development of key transferable skills. These personal transferable skills, they state,

cannot be ‘taught’, as such, but depend on opportunities to practice skills in supportive environments, with guidance to encourage and inform constructive reflection and development of strategies for improvement. Therefore, supportive relationships with supervisors and peers are essential, with self-assessment and feedback from peer groups forming a key component in experiential learning. Drummond *et al* point out that ‘transferability’ of skills often depends on opportunities to practise these skills in a wide range of different contexts and settings.

Cheetham & Chivers (2000) assert that professional education requires a cognitive, executive management component that enables the development of competency where none existed before. Furthermore, Golde & Dore (2001) state that, in addition to set boundaries and objectives, PhD students must be adept at grasping the informal and tacit expectations put on them. This requires an amount of self-knowledge, mental agility and self-efficacy. Another list of cognitive competencies is provided by Morecroft *et al* (2002, p6); these include sense making, analysing, imagining, designing and other challenging intellectual activities. They are regarded as fundamental, and provide a further justification for inclusion of the metacompetencies as prerequisites for doctoral students.

A later study by Boyatzis *et al*, (2002) states that there is “a set of competencies that have been shown to cause or predict outstanding manager or leader performance” (p150). These tend to include abilities from three specific ‘clusters’:

- cognitive or intellectual ability including systems thinking,
- self-management or intrapersonal abilities such as adaptability, and
- relationship management or interpersonal skills; networking and so on.

Boyatzis *et al* posit that the latter two ‘clusters’ comprise what they term ‘emotional intelligence competencies’, as defined by Goleman (1998). This is a form of intelligence relating to the emotional side of life. It includes competencies such as the ability to recognize and manage one’s own and others’ emotions, to motivate oneself and restrain impulses, and to handle interpersonal relationships effectively. Boyatzis *et al* state that, while many educational institutions acknowledge the importance of competencies or skills in graduate management education, they are most often viewed as the remit of career management offices or external parties. Boyatzis *et al* argue that the development of these competencies should be integrated into curricula for all graduate students. They argue that a key challenge in today’s higher education systems involves the development of the student as a whole, rather than the provision of mere ‘pockets’ of learning.

HOLISTIC STUDENT DEVELOPMENT AND FIT WITH THE KNOWLEDGE ECONOMY

Such an observation is set against a rather enveloping backdrop, however. The present Westernised trend of specialisation within a particular field is arguably a by-

product of the industrial revolution, which was especially theorised and addressed in the Tayloristic paradigm of increased efficiency through the division of labour. This has resulted in the division of knowledge, allowing the “siloesation” of skill which has become somewhat redundant in the current climate of globalisation and trans-national business. Indeed, some three decades earlier, Fisher (1974:42) warned of the need to see the student as a whole:

The educational danger of specialization is that it compartmentalizes knowledge. It trains to meet a specialized need and fails to see the total person or the total situation.

Such a narrow perspective is detrimental to Ireland’s role in the modern economy. Lam (1997:976), for example, describes the chasm between the Western and Eastern applications of knowledge specialisation, and the difficulties which two such differing models have in integrating, due primarily to differences in how knowledge and the use of that knowledge is defined and applied by its graduates.

[Insert table 4 about here]

The British model emphasises the Western ideal of the specialised, theoretical knowledge of the individual; conversely, the Japanese model values the collective, practical knowledge of the organisation. Such a concept is much reflected in university education: this “total person” referred to by Fisher (1974) and Boyatzis *et al* (2002), should presumably have ‘[a] grasp of many things brought together into one’ (Buckley and Hurley 2001:549).

Lam’s (1997) research highlights the role which the universities in the respective countries play in developing such mindsets, with British universities focussing on rationality over experience. In effect, universities have continued to build on the division of labour with what Elkjaer (2004:428) terms the ‘trajectory’: ‘...a concept that can be used to identify a phenomenon in time in such a way that it can be understood as an historic course of events’. As the PhD can no longer the serve the sole purpose of the higher education sector, it must begin to fulfill the needs for other researcher career paths (Forfás 2008). It is unwarranted that the trajectory for learning and development at this level should be set solely by academia. Rather, a more beneficial trajectory should be set by the labour markets (including, but not limited to, academia) which ‘...determine the locus of learning, the incentives for developing different types of knowledge... and... the boundary and social framework[s] within which individual learning interacts with collective learning’ (Lam 2000:489).

While Lam (2000) helpfully describes the general levels in which these boundaries exist as namely the *societal*, *organisation* and *cognitive*, it is Antonacopoulou and Chiva (2007) who provide a heuristic means of describing specific domains: these are identified as the *individual*, *group*, *organisational* and *environmental* domains. Referring to the need for change within their own profession,

the interplay between these particular domains is illustrated by psychologists Kaslow *et al* (2004:708) who state that ‘...just as psychologists need to adapt to change, the profession must respond to changes in our knowledge and the marketplace and re-evaluate the competencies necessary for professional practice’. A common theme in these citations is the relational nature of the domains: it is upon the isolation of any domain that a trajectory becomes obstructive to progression in the holistic social embeddedness of knowledge, as described by Lam (2000).

Separation versus Isolation

It is within the context of these domains, and the distinct separation thereof, that Elkjaer (2004) refers to Dewey’s concept of the learning circuit as a precursor to the role of experience in learning (p 424):

...[For example] sound is not an independent stimulus, as the meaning of hearing a sound depends upon the condition and situation you are in when the sound is heard. This means that the environment or the context is part of the interpretation.

This statement illustrates that while domains are indeed separate in essence, they are inherently linked in practice. It is the unnecessary separation of the domains in practical terms which gives rise to specialisation, itself focused predominantly on explicit knowledge, referred to as the knowledge of rationality in Table 4 above. The natural separation of the domains presents a great opportunity for socially embedded learning to occur, whereby ‘...the more recent sociocultural conceptualization of learning as not situated in individual brains, but as “communities of practice” aligning shared understandings of tacit as well as explicit knowledge’ (Rowe 2008:48) is acknowledged and utilised in the Irish PhD context.

Elkjaer (2004:430) describes a ‘third way’ of organisational learning which explores more fully the trans-active nature of learning:

[Insert table 5 about here]

Essentially, this viewpoint helps to move learning from the mere acquisition of knowledge, into the development of individuals into complete ‘social worlds’. However, this development is contingent on the relational context within and across domains; not in any single isolated area. Referring to Dewey, she states that this can occur in three ways:

- Self-actively, where the individual and domain act independently;
- Inter-actively, where the individual and domain influence one another; or
- Trans-actively, where the individual and domain become inherently linked through time and space (Elkjaer 2004).

These three stages of relational development theoretically describe the boundaries which Lam (2000) described earlier as where individual and collective learning occurs.

Development, Boundary Overstep and Competency Transfer

Argyris' (2002:213) conceptualisation of how individuals approach learning using either a 'model I' or 'model II' theory-in-use is most beneficial in the understanding how individuals move from a self-active to a trans-active relationship with their domains. The models are illustrated in Figure 1 and Figure 2 below.

[Insert figure 1 and figure 2 about here]

An individual's developmental progression either acts to reinforce the theory-in-use, thus potentially maintaining what Argyris (2002:213) calls 'skilled incompetence', or encourages development into competency. Development is crucial in moving an individual from this 'skilled incompetence' into a paradigm where competency development can genuinely occur; we have already seen this in the case of Kaslow *et al* (2004) who cited changes in professional knowledge to call for augmentation in educational practices to support necessary competency development. Such a development from model I to model II learning across the active domains of each particular domain is shown in Figure 3 below:

[Insert figure 3 about here]

In this model, the individual (shown by the continuous learning circle as described Elkjaer 2004) initially operates within a self-active mode. However, as the individual develops, he or she begins to move from model I learning, into an trans-active relationship with the other domains. At full development (or self-regulated mode), the individual is able to transfer personal competencies across the other domains, thus developing the individual in the context of the macro-environment, or an expanded "social world". An ideological conceptualisation is shown in below, whereby the same, self-regulated individual is shown operating across all four domains:

[Insert figure 4 about here]

By using Forfás' (2008) report as a basis for instantiating the model in the Irish context, the domains become most relevant:

[Insert figure 5 about here]

Although the trajectory is established by the sector, fulfilling social and economic needs (Forfás 2008), the individual is enabled to engage in model II trans-active relationships across all domains. No longer have we individuals who are self-actively skilled only within a group or organisational level, but rather individuals who are

competent to transfer skills up to sectoral level. These model II capabilities reflect the competencies established by the National Framework for Qualifications (2003), as described in Table 6.

[Insert table 6 about here]

As Ireland embarks on a new paradigm for fourth level education there need to be some careful consideration of how the competency portfolios of our future research leaders are developed. The focus cannot be on more in-depth foundational skills and competencies alone. The seeds of expertise and flexibility associated with well rounded and self-regulating research leaders must also be seen as a core outcome for these students. This mission will require planning and designing experiences for our students which are broader than those conceived of traditionally. The ISSP is in a privileged position to influence and determine such developments if we are indeed to meet the challenge of the becoming a leading knowledge economy.

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TABLES AND FIGURES

Table 1: Projection of PhD Numbers in Science and Social Science to 2013
(Source: Future Skills Needs Report, 2005)

Table 2.4 Projections for Post Graduate Numbers									
Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
SET									
PhD Graduates*	543	606	660	724	801	881	919	958	997
HSS Output* PhD Graduates/Postdocs	187	284	234	285	282	300	306	306	315

*In the same period, 1,815 additional postdocs will have undertaken four years of study in supported research teams
** HSS data groups PhDs and Postdocs as Postdoc awards are an integral part of the completion cycle in HSS

Table 2: Framework for a transferable skill-set for PhD students
(Source: Cryer, 1997)

PhD Activity	Transferable Skill
Engagement in research programme	Being able to see a task or project through to completion Ability to plan, allocate resources of time and money, to troubleshoot To be flexible and change direction where necessary To think laterally and creativity and to develop alternative approaches Ability to accommodate change
Ability to work in a wider field of knowledge through dealing with a variety of literatures	Ability to sift through large quantities of information, to take on board the views of others, challenge premises, question procedures and interpret meaning, i.e. to think critically
Presentation of work to the academic community through seminars, progress reports and the thesis	Communication skills of being effective and confident in making formal presentations; ability to intervene in meetings, to participate in group decisions and to deal with criticism and present case. Written communication skills required for reports, manuals, and press releases as well as the ability to summarise extensive information
Working alone	Self-direction, self-discipline, motivation, tenacity, resilience, and the ability to prioritise and juggle a number of tasks at once.

Table 3: Graduate competencies across levels (Source: Morgavi *et al*, 2007)

Competency	Graduate Student	Master's Student	Doctoral Student
Specialist Knowledge	Mastery of body of knowledge Understanding of current issues Awareness of philosophical bases/methodologies	Mastery of body of specialised knowledge Understanding of current issues Knowledge of philosophical bases/methodologies Ability to transmit information/under-standing to others	Mastery of body of specialised knowledge Understanding of current issues Understanding of philosophical bases/methodologies Ability to transmit under-standing to others Knowledge of protocols regarding publication
General Skills & Capabilities	Critical/reflective thinking Intellectual openness/curiosity Integrity/ethical behaviour Knowledge of ICT	Critical/reflective thinking Intellectual openness/curiosity Integrity/ethical behaviour Knowledge of ICT Creativity/originality Dedication to continuous improvement in research skills Capacity for critical reflection Flexibility in problem-solving	Critical/reflective thinking Intellectual openness/curiosity Integrity/ethical behaviour Deep knowledge of ICT Creativity/originality Dedication to continuous improvement in research skills Capacity for critical reflection/ paradoxical thinking Flexibility in problem-solving Awareness of potential intellectual property and commercialisation/ publication issues
Personal Qualities	Ability to follow set curricula Self-discipline/self-direction Teamworking skills	Ability to work independently or with others Self-discipline/self-direction Leadership skills Personal integrity Adaptability	Ability to work independently or with others Self-discipline/self-direction Leadership skills Personal integrity Adaptability Self-efficacy/ belief in one's contribution to knowledge

Table 4: Rationality vs experiential knowledge (Based on research by Lam 1997:983)

Knowledge of Rationality (British)	Knowledge of Experience (Japanese)
Highly theoretical	Judgemental
Highly specialised	Diffuse/informal/tacit
Work role limited to upstream conceptual design and development activities	Not strictly logical

Table 5: Third way organisational learning (Adapted from Elkjaer 2004:430)

Learning content	To develop experience as part of a continuous transaction between individuals and organization
Learning method	Individual and joint inquiry or reflective thinking – begins with body, emotion and intuition
Relation between individual and organization	Transactional – mutual formation of individuals and organization
Organization	Social worlds

Table 6: PhD competencies

PhD Competences (NFQ 2003:17)		Model II Attributes (Argyris 2002:214)
Competence <i>Context</i>	Exercise personal responsibility and largely autonomous initiative in complex and unpredictable situations in professional or equivalent contexts	Free and informed choice Internal commitment to the choice
Competence <i>Role</i>	Communicate results of research and innovation to peers; engage in critical dialogue; lead and originate complex social processes	Advocate your position and combine with inquiry and public testing
Competence <i>Learning to learn</i>	Learn to critique the broader implications of applying knowledge to particular contexts	Effective problem solving
Competence <i>Insight</i>	Scrutinise and reflect on social norms and relationships and lead action to change them	Effective problem solving Valid information

Figure 1: Model I Theory-in-use (Argyris 2002:213)



Figure 2: Model II Theory-in-use (Argyris 2002:214)

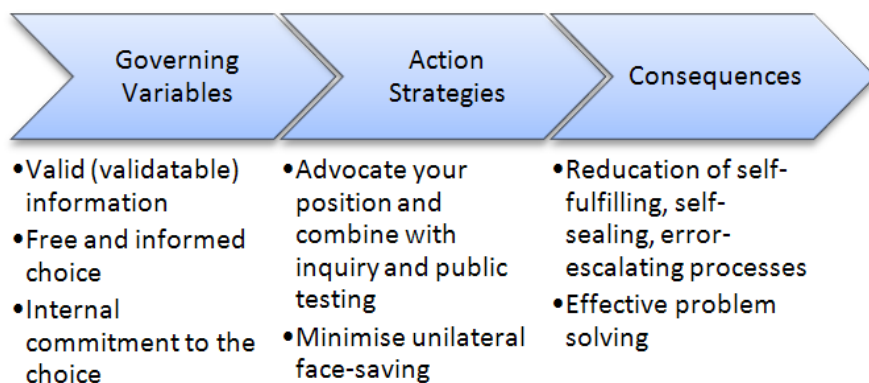


Figure 3: The development of the individual from model I self-active learning to model II trans-active learning

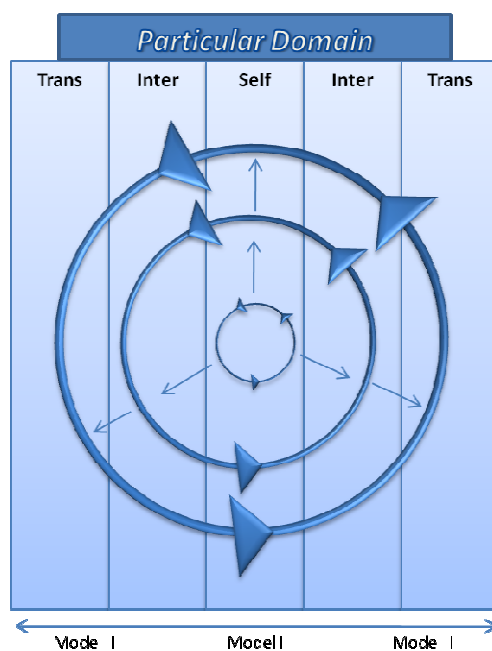


Figure 4: Relationships of particulars in a social world

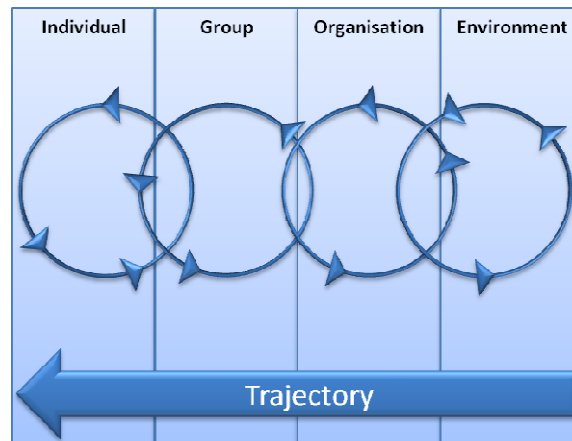


Figure 5: Trans-active development model instantiated in Irish context

