Work integrated learning for the development of professional skills of Information Technology graduates

Srivalli Nagarajan
Faculty of Health Sciences, University of Sydney

This paper reports on findings from a recently completed doctoral education research that studied the professional work experiences of recent Australian Information Technology (IT) graduates. In particular, it will focus on IT graduate perspectives on the relevance of WIL for the development of professional skills that graduates believe are required for their work. While the focus of this work is on recent IT graduates, much of the discussion is relevant to other professions or indeed to all graduates.

Keywords: Work integrated learning, Professional Skills, IT workplace experience, Graduate attributes

Introduction

The transition from the world of higher education into the world of work is complex. According to Dahlgren et al. (2006), much of the research studying the relationship between higher education and work looks at the match between the outputs of higher education and the demands for trained workers. They state that few studies examine what the work requirements are or the relevance and impact of education to such work requirements. Teichler (2007) says, information on the relationship between higher education and the world of work is far from satisfactory (Paul, Teichler and van der Velden, 2000). It is amazing to note the scarcity of the sources of information on a topic that is so high on the agenda in public debates.

Several institution specific data collections aimed at understanding graduate experiences and destinations have been carried out internationally (Teichler, 2007; Little, 2008; Purcell et al., 2005) and in Australia (James, 2001; Booth and Runge, 2005; Goyal and Weiler, 2006). The majority focussed on the transition of students from study to employment. Little attention was paid in these studies to the skill requirements of work or the work experiences of recent graduates.

Crebert et al. (2004) investigated a selected group of university graduates (Microelectronic Engineering; Criminology and Criminal Justice and Leisure Studies) about their perceptions of the contributions that the learning contexts of their universities, work placement and post graduation employment made to the development of their generic skills. The graduates' response showed that they greatly valued the experience of learning in the workplace in their subsequent employment. Another study funded by the Australian Learning and Teaching Council examined the perceptions of recent IT graduates in the workplace to help inform the curriculum and found that many graduates felt satisfied as to how their university had prepared them for their work but perceived themselves as being under prepared in areas such as interpersonal and business skills (ALTC, 2009). Limited research is available in understanding the relevance of university degrees to workplace requirements particularly from graduates’ viewpoint.

For many IT students, one of the main objectives of studying at university is to prepare for employment in the IT workforce. The concept of how well a university prepares its graduates to take up the challenges of the workplace and meet the needs of industry has been widely debated. The professional body, the Australian Computer Society promotes mandatory work integrated learning (WIL) for all IT students to develop their work ready skills. The need for the increasing recognition of knowledge growth via learning by doing (at workplaces) in addition to the knowledge acquired from university is supported by such initiatives. According to Patrick et al. (2009), work integrated learning includes a “range of approaches and strategies that integrate theory with the practice of work within a purposefully designed curriculum”. The main purpose of WIL is to include professional experience, employability, and job ready skills for all IT students using a combination of external models (industry-based work experiences such as placements, internships or work shadowing) and internal models (university-based experiences such as project work, case studies and simulated opportunities) (ACDICT &ACS, 2010).

The relevance of WIL for the development of professional skills of recent Australian IT graduates is the focus in this paper. Professional work experiences are defined as the parts of a graduate’s work that cover professional or
non-technical skills such as communication, teamwork etc. Twenty four Australian IT graduates mostly from NSW participated in the study. They were employed in a paid IT professional position from 0.5 - 3 years. Participants came from a broad spectrum of cultural and ethnic background, worked for small, medium and large sized companies that were either multinational or local and were employed across a variety of IT roles. Some key ideas from grounded theory (theoretical sampling, constant comparison, theoretical saturation, open coding, axial coding and selective coding) were used for data collection and analysis. Interviews and qualitative online surveys were the research methods used (Nagarajan, 2011).

**Study findings and IT graduate perspectives on work placement**

IT graduates face a number of challenges when they first enter employment. Major categories of professional skills that IT graduates believe they require for their work are communication, time management, teamwork, working with people, working across cultures, project management, business skills and personal attributes. The study found that graduates' professional skills are developed in multiple ways including academic, social, personal, professional and other work experiences or a combination of these. The perceived lack of preparation of IT graduates to face new, unfamiliar, unknown or unknowable situations was also highlighted by the study. Some skills (such as working with international clients in different time zones and from different cultures) are currently developed only outside university studies. The IT graduates who participated in the study did not develop these professional skills from their university studies. However, the development of these skills at university is not impossible and would be a useful addition to the IT curriculum. IT graduates in the study believe the most useful components of their university studies when they first entered employment are work placements and “real life like” projects. One graduate says,

……The kinds of things I did ranged…… Being able to have exposure to clients and professionals helped to practice professional social engagement skills. Having to present reports that have your own name on them (being responsible for the content) helps to feel more accountable for success. Meet contacts and network! I got my job from the networking I did on my second industry placement, Put education and theory into practice, to test maturity and responsibility in situations where things can go wrong - i.e. away from the safety of a learning environment.

Other subjects such as projects and project management taught students key professional skills such as teamwork and project coordination. Graduates identified communication skills as the most important professional skill for workplaces. Graduates feel that although most university IT courses include a subject about communication, such subjects are theoretical and do not seem to prepare IT graduates to face the complex communication requirements of workplaces (Table 1).

**Table 1: Communication skills IT graduates believe are required for their work**

<table>
<thead>
<tr>
<th>Communication skills</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appropriate use of language for different purposes</td>
<td>Use of language in communication with clients/peers/superiors; Communication style (formal versus informal); Communication mode (verbal, written, e-mail, online, face-to-face meetings); Documenting communication; Structure of messages; Choice of language in business and technical communication; Ability to communicate bad news – tactical communication</td>
</tr>
<tr>
<td>Communication with senior colleagues and people from different cultures</td>
<td>Communication with older colleagues; Communication in an international work environment with people from different cultures</td>
</tr>
<tr>
<td>Communication while working in a group</td>
<td>Meeting facilitation; Feedback communication; Communication to solve problems; Communication to sell ideas</td>
</tr>
<tr>
<td>Timing of Communication in project work matters</td>
<td>Timeliness of communication; Type of work and communication (project scope communication, project risk communication etc.)</td>
</tr>
</tbody>
</table>

Further IT graduates believe that some professional skills developed at university are applied differently at work contexts. For example, acceptable standards of work submission are different at university from IT workplaces. The study findings demonstrate the complexity involved in the development of professional skills, how and where they are developed and who (university or employers or graduates) assumes responsibility for their development (Nagarajan, 2011). Other findings suggest that some professional skills can be developed
only outside the university studies. Further, certain professional skills are difficult to develop except on real work sites.

There is a particular subject that we did it was a software engineering subject. The objective of the subject was that you actually worked on a real industry problem out at the sponsoring company … it also gave an opportunity to be out in the industry to see how people dress and how people communicate …… It takes away from that brand new, the unknown and makes you more comfortable because you have already had exposure …

WIL approaches such as work placement, in particular, has the potential to contribute to the development of the major professional skills IT graduates believe are required for their work. A pathway between studies and the world of work is provided by work placement. The benefits are:

- Exposure to IT workplace culture and practices;
- First hand experience of how IT teams work and being a part of one;
- Opportunities to develop key skills such as communication and time management;
- Opportunities to work with people from different cultures and non-IT backgrounds;
- Building of networking skills with other IT professionals;
- Enabling students to take responsibility for their own work; and
- The putting of theory into practice.

Through such work experiences students can see their own progress and the development of personal skills such as self-confidence, independence and self-reflection. Scott et al. (2004) discuss experiential learning (this is what graduates who go into work placement and subsequent employment may be able to obtain) as a valuable addition to generic skills development and professional development. A foundation for new ideas, development of a new sense of self, extension of experience beyond academic learning and assistance for students to critique their own experience are some advantages of experiential learning. Multiple skills can be developed through multiple placements in different organisations. If the numbers of work placement opportunities could be increased, IT graduates would gain the opportunity to develop different skills by possibly working with employers with different cultures or in large, small and medium sized companies. For example, in a small enterprise, individuals might be required to work in many different roles (technical and non-technical) while large employers may be able to provide more experiences of teamwork or well-defined roles and tasks.

**Developing employability and work ready skill sets**

Harvey (1999) states that work placement is seen as a model in which students learn principles of lifelong learning, situated learning and transformative learning. Students are provided with a sense of real life workplace settings and helped to exercise their disciplinary knowledge as well as their personal skills in a combination to achieve the employer/client needs. An ALTC study found that Australia’s ICT graduates are technically proficient but not work ready (ACSF, 2009). It reported that 70% of the ICT graduates wished they had undertaken more work experience at university and this observation aligns with most graduate views including my research on work experience and its relevance to work readiness. Crebert et al. (2004) state that graduates believe their workplace learning occurs through collaborative works, their own mistakes, and interaction with colleagues. They conclude that work placement plays a vital role in the preparation of graduates for employment. In my study, many graduates had learned their work ready skills from being “thrown in to the deep end” and “sink or swim” situations rather than through formal learning opportunities.

Dreyfus and Dreyfus (1986) developed a model of skill acquisition which shows that skills are acquired in five levels namely: novice, advanced beginner, competent, proficient and expert. In discussing this model, Eraut (1994) raises the questions:

- What is best learned in higher education?
- What is best learned in professional practice? and
- What is best learned through an integrated course involving both contexts?

Significant interaction between teaching and professional workplaces is needed for a well-planned and integrated project at university. Eraut states that the time required for learning propositional knowledge is considerable as is the time required to learn how to use it (some is suitable for learning after qualification). In IT, a direct responsibility is placed on employers to assist graduates progress from novice to higher levels.

**Facilitating work placement experiences**
Provision of work placement opportunities alone is insufficient. The quality of a student’s work placement learning experiences is dependent on effective liaison between an academic supervisor and industry supervisors. In IT degrees, a year of placement or distributed placement experience during the study years is sometimes offered by so-called ‘Sandwich degrees’. Such degrees have the potential to successfully incorporate work based learning within the curriculum. Yorke and Knight (2002) recommend that work experience be a separate component of a degree requiring students to produce a satisfactory report accepted by both the workplace supervisor and academic tutor. However, they acknowledge the practical problems involved because employer and academic schedules do not dovetail and small companies may be unable to afford the costs and time associated with such partnership commitments.

**Encouraging part-time employment in parallel with university studies**

Any part-time work opportunities whether related to IT, or not, have the potential to provide students with many of the work ready skills they require at IT workplaces. Although, there is evidence that the additional burden of part-time employment can adversely affect graduates’ academic performance (Barke et al., 2000), it can be viewed as a learning opportunity rather than as a threat (Yorke and Knight, 2006). The relevance of studies to employment scenarios becomes more evident when graduates can see the knowledge they have gained from their studies has the potential to go beyond the subject or the degree. One IT graduate says,

Any kind of part-time jobs really because when you’re working in a team, so I worked in McDonalds for two years, worked at a pub, things like that help you with your communication, verbal communication and negotiation and conflict skills

**Providing work based learning (WBL) options**

Learning and work can be related in three ways (Seagraves et al., 1996) and choosing the right learning approach is dependent on understanding the how, where and when learning occurs.

- Learning for work (general vocational education);
- Learning at work (in-house education and training); and
- Learning through work (application of job related knowledge and skills to tasks and processes).

Rossin and Hyland (2003) believe that in higher education, learning for work can be achieved through a combination of learning at work and learning through work. This view is applicable to IT education. It is challenging for employers to manage and facilitate learning opportunities at work but IT employers’ commitment to understanding their workers as learners and supporting their learning from work during the first few years of their employment could greatly assist the development of professional skills of IT graduates.

**Conclusion and future work**

From the analysis of IT graduate perspectives it appears that work placement works well as a model of WIL to ensure students are work ready. The major conclusions of this paper are: 1) Certain IT work skills are difficult to develop except on real world sites 2) WIL approaches (such as work placement, real-life like project work) have an important role in the development of the professional skills of graduates and 3) Different players (professional faculties, employers, professional associations and graduates) need to work together to develop, implement and facilitate WIL approaches that would ensure work readiness of graduates. I believe that the conclusions of this study will be applicable to other IT graduates in the rest of the country and that many of the conclusions apply to more disciplines than just IT. These beliefs could be verified by similar studies in the future both within IT and other disciplines.

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