Research Report

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Developing Professional Expertise in the Knowledge Economy: Integrating Industry-based Learning with the Academic Curriculum in the Field of Information Technology

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In response to the forces of globalization, organizations have had to adapt and even transform themselves. Universities have had to recognize the value of practical working knowledge developed in workplace settings, and promote the value of academic forms of knowledge making to the practical concerns of everyday learning. This paper presents a contemporary case of a designed professional curriculum in the field of information technology that situates workplace learning as a central element in the education of students. Key integrative dimensions are considered along with an analysis of the perspectives of teaching staff and students on the educational experience. (*Asia-Pacific Journal of Cooperative Education, 2004, 5(2), 1-11).*

Keywords: Learning environments, professional education, workplace learning, education design, IT/IS profession

In 2000 Deakin University launched a new Bachelor of Information Technology (BIT) (Hons) program to provide a fast track high quality professional educational experience to highly qualified and motivated students. The program attempted to differentiate itself from other such courses offered within the State of Victoria, Australia by incorporating substantial periods of industry placement. In addition, a major, industry-based, honors minor thesis was incorporated into the program. The BIT program has a central goal of developing students with information systems (IS)/information technology (IT) skills relevant to the business context. The program also aims to develop students' leadership skills appropriate to the changing nature of the global IT industry. The program can be seen as an outcome of both external and internal environmental factors and was designed to position the institution in regard to emerging student and industry needs. A strong commitment to the value of cooperative education was seen as a key vehicle for achieving the program's goals.

A central challenge for the development of such a program is to consider carefully what it means to create a high quality educational experience. Quality considerations are determined by a dynamic interplay of stakeholder needs. The stakeholders of critical importance to the BIT (Hons) program include the students, the academic teaching staff, and the Information Systems (IS)/Information Technology (IT) profession and industry. We conceive quality in terms of a set of productive interactions between these stakeholders. Moreover, quality is shaped through a set of well articulated integrations between the program's academic curriculum, pedagogical and assessment requirements on the one hand, and cooperative education requirements on the other. Essentially, this relates to the overall integration of the benefits of academic knowledge/learning with practical knowledge/learning.

With the first intake of students completing the program in 2002, it was felt timely to formulate a case-study-based research project to investigate the overall experiences of students, teachers and industry mentors. Results of the research are reported in this paper as they relate to the perspectives of the academic teachers and students involved in the cooperative education experience. Interviews with industry mentors at the time of writing are still being undertaken and their perspectives will be reported in future

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publications. The case study aims to illuminate issues about the design of quality contemporary professional curricula in the field of IS/IT which enhance the integration and benefits of academic and workplace learning in cooperative education. We believe these findings are transferable to other cooperative professional education contexts.

Towards Excellence in Professional Education

Universities in recent times have been challenged to make themselves relevant to the rapidly changing nature of a globalizing knowledge economy and its associated workplaces. The knowledge economy is seen as being driven by intellectual and social capital for competitive advantage. The most competitive societies, nations, organizations and individuals are now seen as those who are the smartest and quickest in shaping and responding to ever-changing human needs. Intellectual and social capital is embodied in the new employability skills and fuels the marketability of the new generations of global economic workers. The following list of generic employability skills was formulated by the Australian Chamber of Commerce and Industry and the Business Council of Australia for the Department of Education, Science and Training (2002, pp. 8-9):

1. *Communication* that contributes to productive and harmonious relations between employees and customers;
2. *Teamwork* that contributes to productive working relationships and outcomes;
3. *Problem-solving* that contributes to productive outcomes;
4. *Initiative and enterprise* that contribute to innovative outcomes;
5. *Planning and organizing* that contribute to long-term and short-term strategic planning;
6. *Self-management* that contributes to employee satisfaction and growth;
7. *Learning* that contributes to ongoing improvement and expansion in employee and company operations and outcomes;
8. *Technology* that contributes to effective execution of tasks; and a lengthy list of
9. *Personal attributes* that contribute to overall employability (e.g. loyalty, honesty & integrity, adaptability) (our emphasis added).

Universities increasingly confront the imperative to ensure that these types of employability skills are incorporated into their undergraduate curricula in order to satisfy external industry and professional accreditation stakeholders.

Moreover, universities no longer have a natural monopoly over the creation and application of knowledge for these purposes. Universities have been seen as knowledge-based organizations creating highly specialized but fragmented bodies of knowledge, where the disparate knowledge is not necessarily harnessed to help solve the pressing problems of society. In response to competitive pressures from other forms of knowledge organizations, universities have attempted to re-integrate their knowledge for the purposes of applied research and the teaching of professional courses. In so doing, universities have had to assert their unique differences from other private, knowledge organizations, very much in terms of synergies built between the creation of knowledge on the one hand, and its use on the other (Pittinsky, 2003). Competitive pressures on universities have been exacerbated by globalizing tendencies within the industry and those who believe they can enter it at low cost through the new information and communications technologies (Epper & Bates, 2001). Information and communications technologies (ICT) are reducing barriers to entry for private providers wishing to exploit niches in the virtual global higher education marketplace.

Universities then are confronted with a globalizing higher education marketplace, emphasizing new forms of vocationalism and new arenas of virtual competition. Not surprisingly, the subject of IT itself has been seen as a high potential area for the educational provision of global, virtual course offerings, with such offerings in turn providing the intellectual capital or skilled work forces required to fuel the global IT industry and the global knowledge economy. Australian universities have responded to these external environmental factors by (re)committing to institutional (some might argue corporate) approaches to enhancing the graduate outcomes of their students by providing them with systematic opportunities to develop and be assessed on a set of desired student attributes (many of them the employability skills mentioned above) valued by academia, industry and the professions. Along with graduate attributes, commitments can be seen to experiential learning, particularly expanded use of work placements, the internationalization of the curriculum, and student-centered approaches to learning. Moreover, greater emphasis is being given to enhancing staffing capabilities in all areas of academic work, and the design of innovative organizational and course structures and approaches to bring together related discipline areas around key professional concerns or fields of study.

All of these external and internal changes raise fundamental questions about the design of contemporary learning environments for quality professional education (see Segrave & Holt, 2003). Design considerations are shaped by the interplay of various stakeholder concerns: those of the different academic disciplines and departments contributing to the curriculum; the expectations of industry and professional associations; and the students themselves. These stakeholder interests can lead to tensions between the appropriate composition and balance of emphasis between various academic concerns, and the more practical concerns of external stakeholders. These tensions can manifest themselves around perceptions of emphasis and the relationship between academic knowledge and knowing within the academy, and practical knowledge and knowing grounded in the workplace. This therefore becomes a perceived tension between theory and practice. The contemporary professional curriculum in the field of IS/IT must grapple with these possible tensions, and find some balance and coherence between the academic and practice-

based dimensions of the learning environment. Balance, coherence and integration in turn require some teaching philosophy shaping curriculum design valuing the coming together of the academic/theoretical with the practice of the workplace. Moreover, this requires a strong sense of the developing nature of the field of practice and associated professional expertise required to be an effective entry-level practitioner. A pedagogy supporting the student as active learner, progressively developing their conceptions of effective professional practice, scaffold through the learning experience by a mixture of academic and practitioner guidance and direction seems essential to achieve this, as is an integrated virtual and physical learning environment. Students must be equipped with capacities to know what to do in professional practice but also the knowing of how to do it productively with the acquired knowledge.

A key pedagogy for shaping learning environments relating to educating for professional competence is the co-op placement practicum. Schön (1987, p. 37) defines the practicum as:

> ...a setting designed for the task of learning a practice. In a context that approximates a practice world, students learn by doing, although their doing usually falls short of real-world work. They learn by undertaking projects that simulate and simplify practice; or they take on real-world projects under close supervision.

The practicum may be undertaken then in the university classroom, and/or through a virtual simulation and/or through real-world work settings, physical and virtual, assuming forms of appropriate institutional and local educative supervision. The professional education practicum needs to be clearly contrasted with forms of unsupervised work experience loosely aligned with the academic learning experience. These may provide opportunities for forms of technical training, but not for the development of real professional expertise. The embedding of real-world practica or cooperative education opportunities within the academic curriculum becomes a hallmark of a contemporary professional program. It provides the all-important contextual knowledge for allowing students to begin being and feeling like a professional or professional identity formation as Grosjean (2003) refers to it:

> In the workplace, however, disciplinary knowledge is constructed in the milieu of practice—it is not learning then doing, but rather learning by doing; not learning theory for practice, but learning theory in practice; not learning about a profession, but learning to be a professional. The process of constructing professional knowledge in co-op, then, can be seen as a complicated mixture of disciplinary identity, values, rhetorical purposes, and technical content. (p. 10)

Students require systematic preparation for undertaking real-world practica, guidance and mentoring during the actual practicum experience and opportunities for academic reflection and learning post practicum placement. The opportunities for further application and development of learning through subsequent practica can enhance the experiential learning cycle. Throughout the cycles of experience-reflection-theorizing-experimentation, students should be strengthening their professional conceptions and practices with a growing understanding of the interplay between theorizing and practicing as it relates to engaging with the real problems of the workplace. It can be argued that the intersection between theory and practice and the valuing of both is the development of professional judgment making. Norris (2000, p.181) observes that, "The required mediation between abstract and general knowledge and concrete and specific situations is an activity requiring much professional competence and sound judgment."

Other adult and professional educators like Schön (1987) see a more fundamental reconceptualization of the theory/practice dichotomy by privileging in the educational enterprise practitioners' learning to theorize their own practice, although in saying this he notes:

> Perhaps we learn to reflect-in-action by learning first to recognize and apply standard rules, facts, and operations [characteristic of the academic curriculum]; then to reason from general rules to problematic cases, in ways characteristic of the profession [characteristic of academic curriculum and the practicum]; and only then to develop and test new forms of understanding and action where familiar categories and ways of thinking fail [characteristic of extended practicum and ongoing professional experience]. (Schön 1987, p. 40)

Whether it be theory-based practice or practice-based theory, professional judgment making capacities seem critical to both views. Importantly, theory and practice are brought in different ways into close alignment, a characteristic of a well designed professional curriculum.

Integration Framework for Understanding Program Design for Quality Professional Education

Building upon the above discussion, we have conceived learning environments most conducive to quality professional education in the field of information systems and information technologies (and therefore of direct relevance to the BIT program) in the form of a coherent set of integrations in accord with the following dimensions (see Figure 1):

1. Integration of information systems (IS)/information technology (IT) business and technical perspectives: students able to synthesize their technical and business related studies of IS/IT;
2. Integration of academic curriculum with the world of work: students able to use their academic learning in the workplace and workplace learning in their academic studies;
3. Integration of academic research with workplace concerns: students able to undertake a major research project based on practical concerns and experiences faced in their periods of industry-based learning;

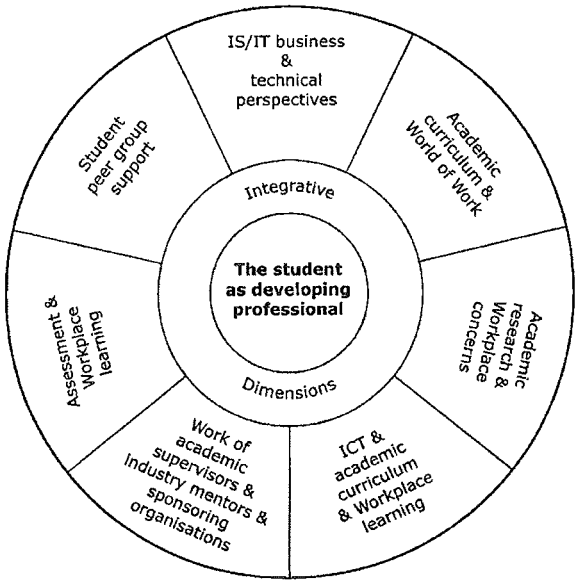

Figure 1
Integration framework for designing quality professional education: A student-centered approach

4. Integration of ICT with academic curriculum and workplace learning: ICT is seen by students as a coherent area of study in the academic curriculum and practice in their work placements, and that ICT is used appropriately in supporting academic practica learning experiences;
5. Integration of work of academic supervisors with industry mentors and sponsoring organizations: students understand the respective roles of key academic and workplace educators in their overall learning, and that the contributions of both stakeholders benefit the students' professional education;
6. Integration of assessment with workplace learning: students see the workplace as a key site of learning in relation to academic, industry, self- and peer-assessment supportive of their professional development; and
7. Integration of student peer group support: students see each other in their academic studies and in their work placements as key learning resources.

The Aims of the Study

Researching the BIT Hons program was seen as a significant opportunity as it strongly encapsulated the University's strategic imperatives and therefore was seen as an interesting case of designing professional curricula for quality learning. The study is aimed at helping us understand and explain how learners and teachers approach the task of integrating and using academic and workplace learning in the field of IS/IT. The study addresses the central question of effective ways of designing quality professional curricula to enhance the development of professional expertise in university graduates through the strong integration of study/theory and work/practice. The study's aims are as follows:

1. Examine students' experiences of learning in the program, including their views on the value and importance of various aspects of the program's curriculum, pedagogy and assessment practices;
2. Examine students' experiences of learning during their industry-based placements and applied research projects;
3. Examine students' experiences in developing and using academic and workplace learning;
4. Understand students' conceptions of the attributes of professional capability/competence on graduating from the program;
5. Examine academic teachers' experiences in supporting student's learning in various aspects and at various stages of the program;
6. Examine industry mentors' views on desired student attributes for effective performance in the IT industry;
7. Identify key dimensions of contemporary learning environments enabling quality professional education in IS/IT and other professional fields where appropriate;
8. Draw on and link to other relevant research being undertaken within Deakin, nationally and internationally; and
9. Outline best practices in designing professional curricula to achieve desired integration and benefits of academic and workplace learning for key stakeholders.

Research Methodology

The Context of the Inquiry

The BIT(Hons) program is a 32 credit point program which can be completed over three years of full-time study based on a trimester offering of units. The program is accredited by the Australian Computer Society (ACS). The ACS accredits courses in relation to 14 areas of knowledge constituting what it terms the Core Body of Knowledge in IT (The ACS Core Body of Knowledge For Information Technology Professionals: http://www.acs.org.au/static/national/pospaper/bokpt1.htm). The BIT(Hons) program has a current annual intake of approximately 15 students. The program is taught jointly between the School of Information Systems and School of Information Technology in the Faculties of Business and Law and Science and Technology, at Deakin University, Australia, respectively. As part of the program, students must complete 2 periods of industry placement amounting to 8 credit points and an industry based research project of 4 credit points.

The goal of the BIT Hons program is to provide students with the IT and business skills required to meet challenging and diverse career options in response to the world-wide demand for professional expertise in information technology. The following key skills are developed as part of the program:

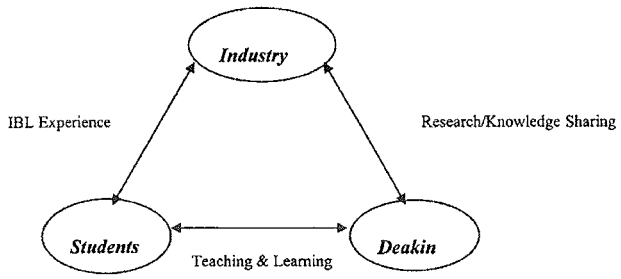

Figure 2
Relationship between industry, students and Deakin University

1. *Technical skills* in systems analysis and design, software development, database management, electronic commerce, data communications, research methodologies and project management;
2. *Problem-solving skills* in addressing real business problems;
3. *Written and communication skills*; and
4. *Strategic and leadership skills* in evaluating the IT imperative in a business context.

Two key areas of the BIT curriculum differentiate it from other IS/IT courses offered by the University, namely: the significant weight given to industry-based learning (IBL); and, related to this, the BIT (Hons) year involving a practice-based research project. The principal intent of undertaking IBL is to provide students with the opportunity to both apply their recently gained IT knowledge (mostly theoretically-based) in a real business environment, while at the same time gaining an appreciation of commercial imperatives. Specifically, the aims of IBL are to enable students to: develop their theoretical and practical skills in a real world business setting; practice their acquired computing and business skills on real problems; demonstrate their capacity to solve IT problems and to work as members of a team; and design solutions to complex problems as experienced in their workplace (Mackay, 2002a, pp. 3-4). One academic teaching staff member interviewed as part of our research reflected on how IBL placements cultivated the maturation of the students and the consequent benefits for their academic learning in the program:

> When the student comes back from IBL they are significantly more mature. It is more than just the eight months. In the final year you are talking to a student who has a great deal of depth in all sorts of things. They tend to have an enhanced purpose because they have seen the workplace. They also have a way of presenting themselves because they have been working in an adult graduate world for eight months as a professional. When they return you can challenge them and engage them in discussion about issues at a depth that wouldn't have been possible if they hadn't had the eight months. They genuinely understand what it is like to be in the workplace. They understand how the technology fits in a way that their peers who haven't had industry placement don't have the ability to do generally. ...When I am working with students who have done IBL I tend to engage them in a discussion at a greater depth. (Staff interviewee 2).

A defining feature of cooperative education (in this case, the industry practicum) is that students are involved in "planned, productive work" and not merely where "the student's primary function is to observe or 'shadow' professionals at work" (Ryder, Wilson, & Associates, 1997, pp. 2-3). The BIT IBL placements provide these opportunities for productive work in pursuit of the program's goal. Moreover, beyond developing technical skills the IBL placements are designed to allow students to develop broader personal, social and career understandings. These understandings are developed through IBL journal keeping and reflective reporting at the end of each placement. The relationship between industry, students and Deakin University relating to the BIT program is depicted in Figure 2.

The two IBL placements must be of a different kind, involving different types of systems design, programming and project management work, and are usually undertaken in different organizational settings. The objective is to provide varied work in diverse settings to expose students to the broadest range of learning opportunities to enhance their professional competence consistent with the program's goals and academic curriculum. They occur between students' foundation studies in IS/IT and the final honors' year. The placements are formally assessable as pass/fail only, with an industry mentor completing an evaluation report on the student and the academic supervisor assessing an IBL journal and report completed at the end of each placement. Students are briefed by academic supervisors before they undertake an IBL and visited by these staff on entering and exiting the placement. An exit presentation must be given by the student to both the academic supervisor and industry mentor as well. During the IBL placements students can take advantage of the University's computer conferencing system to allow them to interact with their peers and academic supervisors. This provides a sense of online professional community support facilitative of learning in the workplace.

During the IBL placements students have the opportunity of negotiating with their organizational sponsor the possibility of undertaking a sponsor-selected research project as part of their BIT (Hons) year. This is mutually advantageous to the students and the sponsors. It forms a key learning partnership characteristic of the latter stage of the program.

The other key differentiator, the BIT (Hons) year, is designed to provide in-depth specialization in a number of contemporary IT fields and to provide training in research techniques. Advanced coursework relates to research skills/methods and contemporary issues in IS/IT, with further options to develop advanced knowledge in both the technical and business context dimensions of IT. The students' research projects preferably, as noted above, relate to IBL sponsor concerns, consistent with the research

interests of those academic teaching staff involved in the program. The project aims to give students experience in undertaking a significant task, requiring the exercise of considerable initiative and dedication, the development of research methods and expertise, and potential for higher degree research if they so choose (Mackay, 2002b, pp. 3-5). Another academic teacher interviewed as part of the research project outlined the distinctive nature of the applied research project in the program:

> It was a case of initially talking about research ideas. It was a case that many of them have generated their ideas from being out in industry and seeing real life problems and they were forward thinking that into their honors year. They came to me and said they knew this is an issue because they had seen it in their IBL and then we talked about the requirements for honors. We then formulated a project and they contacted their former company that they worked with and they agreed to be a partner of it in terms of the research. ...They use the company to validate their research. It reflects applied research away from the more theoretical research which usually gets carried out for honors.
>
> In terms of honors projects there is a very clear distinction between students who have very theoretical honors programs and those who are able to make it very applied within industry (Staff interviewee 5).

Choice of Research Methodology

Case study methodology has been chosen as the means of developing our understandings of the various stakeholders' perspectives. Case study belongs to the interpretive qualitative research tradition, a tradition of research which has developed in distance education (Holt, 1993; Morgan, 1984, 1991) and advocated in cooperative education research (Coll & Chapman, 2000; Grainger, 2001). We wish to understand how students, academic teaching staff and industry mentors interpret and act on various aspects of the BIT program. This requires empathetic understanding and exploration of key parties' subjective realities of being involved in the program; that is, how they engage with the program's learning environment, and attribute meaning and value to its key components. Central to this is the focus on the students' learning experiences. We are not necessarily interested in causal explanations of the phenomena under investigation but are more interested in deepening and extending knowledge of how and why the BIT program is perceived and experienced by the key parties the way it is. The constructed realities of learning and teaching within the BIT represent a set of interactions within and between the key parties involved in the educational enterprise and requires illumination. The cultures of academic teaching/learning and workplace teaching/learning and their interrelationships becomes an important area of research. This type of cultural analysis belongs to the ethnographic field of research (Hammersley, 1990; Hammersley & Atkinson, 1983), and many features of ethnography can be found in the research (with the exception of direct observation by the research team of students in their work placements which was deemed unfeasible given the constraints of the study).

It is intended that generalisations might be made about the Deakin BIT program as the case in action, or single setting/group, under investigation and that these generalisations might resonate with other providers of such programs in the field of IS/IT and practicum-based professional programs in higher education more generally.

The range of case study data gathering methods used in the research covers: surveys of IBL placements; interviews with graduate students; surveys of graduate students; analysis of IBL journals and reports; interviews with academic teachers; interviews with industry mentors; analysis of student theses; and analysis of students' IBL online communications.

Results and Key Considerations

To date, the 13 academic teaching staff who have been involved in teaching the program have been interviewed along with the first cohort of students (eight in total were interviewed after graduating from the program at the end of 2002) on the overall course experience. In addition, student survey feedback on IBL placements has been collected. (List of staff and graduate interview questions, and copy of the IBL survey can be found in the Appendix). A number of key considerations have emerged relating to students' and teachers' experiences of the course based on these data.

First, students report gaining significant value from their IBL placements (i.e., their direct experience in the workplace) and associated work placement preparation and assessment tasks (i.e., preparation for IBL placements, diary keeping, exit presentation for academic supervisor and industry mentor, report preparation on IBL experience). Seven of the eight graduate students identified IBL as the most valuable aspect of the course as it provided the opportunity to gain first hand experience of the workforce as well as hands on experience of working on real projects. This was exemplified through the comment of one student about the need to learn to do things correctly to business standards such as documentation and working with industry standard software. Another spoke of the independence and self-reliance gained from the IBL experience: "When you go into the workforce you are on your own – there is no one there to hold your hand and guide you through it all. You are expected to do your job, do it well and do it on time". The IBL was considered to be highly regarded when applying for jobs. As one graduate stated, "All the employers where I was interviewed were very interested in what sort of experience I had and what skills I learnt from IBL".

However, the IBL surveys showed that the value derived was not seen as consistently high across all IBL placements and across the full range of desired student attributes. The experience seemed to vary in terms of company culture, size of the company, style of management, types of tasks given (both nature and complexity), level of responsibility given and working in a team or independently. Students self-reported significant/extensive development through IBL placements in attributes like self-confidence,

flexibility and adaptability, ethical judgment making and skills to implement change, but less so in the areas like oral and written communications. The graduate students though on reflecting on the entire BIT IBL experience did rate communication skills along with teamwork and technical skills as important competencies developed. Ability to learn new things, the life-long learning attribute, was also highlighted with one graduate student observing, "Half the stuff we learnt in first and second year is out of date now – so you need to be able to learn. You need to understand how to take things in and work out how to solve problems."

Students will make their immediate assessments of the value of IBL placement-by-placement as reported through IBL surveying. We surmise that at the end of the course graduate students are in a stronger position to reflect holistically on the importance and development of the broadest range of attributes. It would seem that IBL is a unique learning environment conducive to the development of the broadest range of attributes from the technical to ethical to communicative to intra- and inter-personal. Graduate students were less confident about how they will go about developing their professional expertise and career mentioning the need for specific training courses for particular skills and the intent to move around jobs and gain different experiences of the workplace. Even on graduation we believe students-as-novice practitioners are still exploring and searching out opportunities in the development of their professional identity. The course provides opportunities we believe to understand the key ingredients or attributes underlying professionalism in the field, and yet the formation of professional identity is ongoing.

Second, staff interviews raised important questions about the nature of a contemporarily designed professional curriculum in the rapidly changing and interrelated fields of information systems and information technology. The practice world is seeing the convergence of IT and IS around the computer-based information needs of business for efficiency and competitive advantage in the knowledge economy. The BIT is in effect supporting an emergent field of professional theorizing and practice with the need for inter-disciplinary perspectives and a broad range generic student attributes required of and developed in the IBL and industry-based research components of the course. In this respect the separate academic disciplines, structures and cultures of IS and IT give way to the converging needs of effective practice in the field and this may have implications for the best ways of managing the program over time. Possible points of difference can be seen in staff views on the impacts of changes in the use of computer languages in industry. As one staff member noted:

> There has been a major move driven by moves in programming languages towards object oriented technologies. The style of programming languages have moved in the last decade or so and the way of specifying systems has therefore had to change as well. Our subject has followed that. In the last 12 months it has been substantially rewritten so that it now reflects the sorts of skills that people particularly need (Staff interviewee 2).

Whereas another staff member believed that:

> The units that I teach are fundamental to the technical programming side of computing. ...These units are fundamental to computer programming and are presented in a generic way. The units are not affected by major trends in IS/IT. This question would be more relevant in third year units. I don't teach these (Staff interviewee 4).

The former was aware of changes in programming languages directly impacting his subject, while the latter seemed to be unaware of the possible impact such developments might have for the business information systems side of the BIT curriculum.

The entire BIT academic and workplace curriculum must be designed and communicated clearly to students with this practice convergence in mind. It will be an ongoing challenge to ensure the appropriate balance and relationships between technical computing, business context understanding, inter-personal/social, problem solving and life-long learning as key areas of professional expertise. This requires strong boundary spanning academic leadership skills in order to keep well aligned key disciplines, curriculum components and learning resources used in supporting student learning. Moreover, the student view of the experience is central. They look for a coherent and integrated program which explicitly and systematically develops their professional expertise, the process of them becoming an effective professional, from beginning until end.

Conclusion

These considerations, we believe, require ongoing critical reflection and informed action by those charged with the responsibility of designing and teaching within the BIT program. They require nothing less than a considered but flexible position on the future possibilities of IS/IT emerging as a coherent, integrated and collaborative field of academic and practical professional endeavor. This requires a holistic approach to continuous quality improvement as it relates to designing learning environments supportive of excellence in professional education. This process, and the supporting research, is ongoing. It will explore more deeply students' experiences of their IBL placements through interviews with industry mentors and the analysis of students' IBL journals and reports. Moreover, we will be examining the work of students' industry-based research projects and relationships with their IBL placements in completing the critical perspectives on the program.

Acknowledgement

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References

Coll, R.K., & Chapman, R. (2000). Choices of methodology for cooperative education researchers. *Asia-Pacific Journal of Cooperative Education, 1*(1), 1-8.

Department of Education, Science and Technology (DEST). . (2003). *Employability Skills for the Future (2002). Report by Australian Chamber of Commerce and Industry and Business Council of Australian for Department of Education, Science and Technology (DEST).* Retrieved April 23, 2003, from http://www.acci.asn.au/text_files/reports/Employability_Skills.pdf

Epper, R.M., & Bates, A.W. (2001). *Teaching Faculty How to Use Technology Best Practices from Leading Institutions.* Westport, CT: American Council on Education and The Oryx Press.

Grainger, S. (2001). Accessing professional artistry: The importance of cooperative education and the limitations of classical research. *Asia-Pacific Journal of Cooperative Education, 2*(1), 1-5.

Grosjean, G. (2003, August). *Co-op in the knowledge economy: critical competencies and 'fit'.* Paper presented at the 13th World Conference on Cooperative Education. Rotterdam, The Netherlands: World Association for Cooperative Education.

Hammersley, M., & Atkinson, P. (1983). *Ethnography: Principles in practice.* London: Tavistock.

Hammersley, M. (1990). *Reading ethnographic research: A critical guide.* London: Longman.

Holt, D. M. (1993). Changing conceptions and practices of management: Professional learning from an MBA experience by distance education. *Distance Education, 14*(2), 232–259.

Mackay, D. (2002a). Bachelor of Information Technology (A Degree Available with Honours), Guidelines for Industry Based Learning, Second Semester and Summer Semester 2002-2003, Deakin University.

Mackay, D. (2002b). Bachelor of Information Technology (A Degree with Honours) Honours Program. Faculties of Business and Law and Science and Technology, Deakin University.

Morgan, A. R. (1984). A report on qualitative methodologies in research in distance education. Distance Education, 5(2), 252-67.

Morgan, A.R. (1991), 'Case-study research in distance education', Research in distance Education. A unit in the Deakin University and University of South Australia's Masters in Distance Education. Geelong: Deakin University.

Norris, S. (2000). The pale of consideration when seeking sources of teaching expertise. *American Journal of Education, 108,* 167-195.

Pittinsky, M.S. (Ed.). (2003). *The wired tower: Perspectives on the impact of the Internet on higher education.* New York: Pearson Education.

Ryder, G., Wilson, J.W., and Associates. (1987). *Cooperative education in a new era: Understanding and strengthening the links between college and the workplace.* San Francisco: Jossey-Bass.

Schön, D.A. (1987). *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions.* San Francisco: Jossey-Bass.

Segrave, S. & Holt, D.M. (2003). Contemporary learning environments: designing e-learning for education in the professions. *Journal of Distance Education, 24*(1), 7-24.

The Australian Computing Society. (2004) *Core body of knowledge for information technology professionals.* Retrieved February 13, 2004, from, http://www.acs.org.au/static /national/pospaper/bokpt1.htm