Expanding the realm of best practices in cooperative industry-based learning in information systems and information technology: an inter-institutional investigation in Australian higher education

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The professional fields of information systems and information technology are drivers and enablers of the global economy. Moreover, their theoretical scope and practices are global in focus. University graduates need to develop a range of leadership, conceptual and technical capacities to work effectively in, and contribute to, the shaping of companies, business models and systems which operate in globalised settings. This paper reports a study of the operation of industry-based learning (IBL) at three Australian universities, which employ different models and approaches, as part of a series of investigations of the needs, circumstances and perspectives of various stakeholders (program coordinator, faculty teaching staff, the students, industry mentors, and the professional body). The focus of this paper is a discussion of salient pragmatic considerations in an attempt to conceptualize what constitutes best practice in offering industry-based learning for higher education students in the disciplines of information systems and information technology (Asia-Pacific Journal of Cooperative Education, 9(2), 73-80).

Keywords: Best practice; cooperative learning; higher education; information systems; information technology.

In the higher education context, many find the idea of applying quality concepts to education is an anathema (Anderson, 2006) but, where the academy and industry meet, there is abundant evidence of interest in this area. What constitutes 'best practice' in cooperative industry-based learning (IBL) has been investigated by many authors. For example, the *Journal of Cooperative Education and Internship* (JCE&I, 2007) seeks "to disseminate research, best practice, and innovation in work-based learning". A substantial review of similar research in other sources has recently been provided by Bartkus, (2007). An earlier paper (Holt, Mackay & Smith, 2004, p. 2) argued that "quality considerations are determined by a dynamic interplay of stakeholder needs" (such as academic disciplines and departments contributing to the curriculum, the expectations of industry and professional associations, and the students). Quality can therefore be viewed as a set of productive interactions between these stakeholders, and shaped through a set of well articulated integrations between the academic curriculum and industry requirements.

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This paper reports an investigation of salient pragmatic considerations, in an attempt to conceptualize what constitutes best practice in offering IBL for higher education students in the disciplines of information systems (IS) and information technology (IT). The study focuses on three universities in Victoria, Australia, each of which employs variants of how industry IS/IT placements are organized and integrated into related undergraduate degree programs (see below). Each model must therefore be understood within the organizational context of each school/university. Hence, the study was not construed as a search for *the* definitive model. Rather, its aim was to facilitate the development of a conceptual framework to prompt discussion about the design of these types of experiences and what may work for their own particular course and context. A formulaic model (the *definitive set of best practices*, the *optimal model*) is rejected on the basis that it is reductionist, and probably illusory, for it denies the complex political and the cultural realities that contextualize the education. Consequently, we advocate in-depth understanding of what is done in carefully selected areas of demonstrable relevance, to understand the contingent nature of application in the local setting.

It is more important to create awareness of the questions that need to be asked than answers that need to be given. These should be anchored at the local level and premised on a deep understanding of the salient issues and possibilities and of the underpinning realities of individual circumstances, including areas of contestation and constraints as well as opportunities. In this way it is possible to identify salient considerations through which best practice can legitimately be conceptualized.

IBL MODELS

In seeking to understand more fully IBL in the context of IS and IT, earlier research (Holt et al., 2004; Smith, Mackay, Challis & Holt, 2006) has been extended from Deakin University to RMIT University and to Swinburne University of Technology, which have both been operating cooperative education as part of their IS/IT offerings for almost two decades. Appendix A summarizes pragmatic features of the models for each of the degree programs, whether the IBL components are mandatory or optional for students, the timing of the components within the program, the duration of the components, and the models used for student remuneration.

STUDY SCOPE AND METHODOLOGY

In addition to drawing on written input, including information in the public domain, curriculum documentation and previous surveys, the principal data collection method used in the present study has been interview and focus group discussions (Coll & Chapman, 2000), as summarized in Appendix B. Each interview and focus group discussion was digitally recorded with the participants' knowledge and consent, and the data was then organized under key headers pertinent to the study. While maintaining the integrity of responses, minor editing of responses has been undertaken to aid clarity. Quoted comments have been selected as typifying student or staff response.

Two previous papers (Holt et al., 2004; Smith et al., 2006) have reported the results of the research undertaken in the first two stages. While the perceptions that frame this study are derived from the cumulative research experience, quoted supporting data are drawn from Stage 3.

THE PRAGMATICS

This study concentrates on three practical issues of compulsion, timing and finance (see Appendix 1), as these constitute the fundamental parameters of the educational application. A previous paper (Smith et al., 2006) concerned pedagogical issues.

Mandatory or Optional

At the two universities where IBL is mandatory (Deakin and RMIT) there are movements to make the experience optional, as it is at the third (Swinburne). A prominent argument in support of optional as opposed to mandatory IBL is the perceived difficulty and resource implications of finding suitable placements for all students, particularly when the cohort includes international students.

It is important to note that in Swinburne programs (other than the BIT), the placement is left to student discretion (assuming they have the requisite academic and personal skills). Significant numbers do not take up the offer, with an estimated 73%of those eligible last year participating:

> Very few [less than 50 per cent if the entire cohort including international students is considered] do the placement … It is voluntary and we have more placements than we have students to take them and that's a very disturbing thing, and for some reason students want to finish their degree quickly … [Yet] most students who go on IBL placements are very positive and certainly they've learnt a lot from those experiences. (Swinburne, 2007, Staff Member 1)

Students interviewed were quick to recognize that this "runs the risk of those people that perhaps would benefit the most from it who are not confident enough to have a crack at it deciding not to do it because it sounds a little scary," and when they become employed, they are "freaked out" (RMIT, 2006, Student 1). At RMIT, where the IBL - albeit in different configurations - is currently mandatory, staff acknowledge quite widespread reluctance:

> There's a real reluctance from a lot of them. It is enormously scary for our students and they drag their feet. And it's kicking and screaming in some cases. But, once they're there and they realize, then, 'I'm so glad I did it'. (RMIT, Staff Member 2)

Further, even for students who voluntarily choose to embark on IBL, and who value the experience highly on its completion, misconceptions abound at the outset:

> I was very skeptical … I had fears that I'd just be walking around doing photocopying. You don't want to waste a year. That was a big fear and I was quite concerned about that. (Swinburne, 2007, Student 2)

Lecturers were unanimous that students who missed the experience were generally far less capable. All spoke in some way about demonstrable maturation and a change in attitude on their return, as well as enhanced skills through the experience that impacted on their learning in their final year. A lecturer who had groups of students with and without the IBL experience responded to the obvious differences and potential difficulties by mixing groups "because the ones who've done IBL can guide" (Swinburne, 2007, Staff Member 2), conceding that this may not represent the best learning for the IBL experienced students. All lecturers identified IBL as the single best feature of their degrees, primarily because it realized the alignment of their programs to industry. The experience provided a quantum step towards realistic practice and it gave students an understanding of that practice and confidence that they could meet its requirements.

There was remarkable unanimity in the student voice, about the value of the IBL. All but one (Deakin) student, who is demonstrably atypical in that he is the sole graduate who chose to

continue to doctoral studies, were adamant that the industry-based experience was *the most important and valuable aspect of their degree*. Students interviewed were asked to rate their placement on a scale of '0' (= worthless) to '5' (= so valuable that you would change nothing) and, significantly, irrespective of model, none rated it below '4'. Indicative comments were:

> If IBL was the entire course it would be a 10 out of 10. (Deakin, 2006, Student 4)

> It's extremely difficult if not impossible to really teach some things in the classroom so [it's so valuable through the IBL] when you step out into the real workplace and start knowing what people actually want from you and what the expectations are. And it also helps to judge more what it is that you want to do … because it's hard to pick it up from an academic point of view and from subjects to actually know which direction you want to try to take your career in. (RMIT, 2006, Student 1)

> Everything I imagined IBL to be there was there – the work that I was doing, the people I was working with, the requirements, the time frame, the learning environment. (Swinburne, 2007, Student 1)

These data tend to support the view that IBL should be compulsory and the positive experiences reported arguably justify the effort and resources expended in mounting such opportunities for students. However, there may be insuperable practical difficulties in setting up placements for large cohorts, and there is a tension between providing high quality placements for all elective students and the potential diminution of quality if IBL placements are compulsory.

As well as the institutional capacity to source and then support placements, another issue emerges - to what extent are the profiles of various student cohorts matched to the demands of IBL placement? For example, the situation of international students with visa requirements, students who already have significant workplace experience, and high caliber students undertaking double degrees. All may argue for or against the notion of compulsory IBL components in some degree programs.

Timing and Duration

As argued in earlier research (Holt et al., 2004), a characteristic of a well designed professional curriculum is that theory and practice are brought, in different ways, into close alignment. In this context, the timing of IBL is a critical decision and one that is inevitably coupled with the selected duration and whether there will be a single IBL experience or multiple experiences. As discussed, the models ranged from single placements of a full year, to two periods of 16/17 weeks. The duration varied, even within the same institution, as Swinburne offers 20 week, 6 month and 12 month placements in IS/IT programs.

The salient issue that emerged from the interviews and focus group discussions within the universities, supported by interviews with mentors in the IS/IT industry, was that timing was highly dependent on students having sufficient technical knowledge to make a worthwhile contribution. For this reason, it is understandable that no-one argued for IBL to occur until at least one year had been completed and only then on the basis that it was a short, targeted period that gave students an understanding of the realities of working in industry. It also serves as a prelude for a more extended placement occurring at the end of the second year for a one year placement or, as is the case with the Bachelor of Business/Information Technology [BBIT/BIT] at Deakin and at Swinburne, it was the first of two placements. An important consideration in placing significant IBL experience at this juncture was the caliber of the students:

> The BITs go earlier (beginning of second year and the end of third year) but my students aren't BITs. They (the BITs) are highfliers and a particular kind of person. (Swinburne, 2007, Staff Member 2).

Given our claims regarding cultural specificity, it is not surprising that, while they were prepared to debate the value of other structures, the staff and students of each institution saw advantages with their own model:

A year is the best duration. The nature of the role would change if it was only a 6 months placement – they would tend to give them a project which would be very much contained and the skills developed would decrease. In the longer term they really become part of the organization rather than an add-on. (RMIT, 2007, Staff Member 2)

Depending where you are, and what you're doing, of course, but you have to be there for a full year as a minimum. You've got your initial step, when you're in, you're completely green, you've got no idea what you're doing, then you'll gradually pick it up but then by being there for the year you come out of it being very good at what you're doing whereas if you're got 6 months you're only coming from knowing nothing to knowing a little bit. (RMIT, 2006, Student 1)

The year is better because they really have to settle into the workplace and start contributing. … Having it for the year you have to knuckle down and master the art of being in the workplace. (Swinburne, 2007, Staff Member 2)

I think six months would have been too short. You wouldn't have been able to develop those skills so much – it would seem more like a work experience type thing than a job. Out for twelve months … we were like full-time employees there. We worked for them. Anything shorter and it feels like you're in a real temp job. (Swinburne, 2007, Student 1)

Our model allows variety and nearly all students get two different placements and experiences, donors see two different students and on the rare occasions it's a minor disaster you have the student for 16 weeks, not 48. (Deakin, 2006, Staff Member 1)

I think 16 weeks is long enough, as a student, to learn something. And it's long enough for the employer to see that you've learnt something and to start giving you a bit of responsibility. If you stretch it out to a year I think employers could almost start to abuse it by actually starting really to pile work on you because by the end of that year you should be pretty proficient at whatever it is that you're doing. (Deakin, 2007, student 3)

Deakin students responded positively to the diversity of the experiences. Only one student indicated he would have taken the option of a single longer placement provided he was placed in the one that had proven to be more valuable for him. While some staff at other institutions thought "diversity would be nice," the critical consideration was how this could be managed in the context of large cohorts. Again, the realities of the local environment will be, and should be, a strong determinant in terms of how such decisions are made.

Remuneration

As detailed above (and see Appendix A) universities respond differently to how students will be financially compensated. Deakin offers industry sponsored scholarships of approximately AUD$27,000pa (tax free). The scholarship covers selected students for the entire degree study, not just the placements, and has the perceived advantages of assisting sponsors spread the cost and giving students an adequate and sustained financial basis. At Swinburne, students referred to salaries during their year placement of AUD$28,000 tax free. They appear content with this as it represented a base level salary in the industry and was adequate to support them without their having to rely on additional part-time work.

In contrast, some students at RMIT receive only their transport costs for the duration of the placement. A student in this position spoke of "two different voices fighting with each other." On the one hand he "got involved, got trained, got used to it and learnt a lot," on the other he felt exploited but he concluded that "the good side won as I got the experience" (RMIT, 2006, Student 2). His viewpoint typified the reaction from students interviewed. The IBL experience, itself, was the critical factor. As one Deakin lecturer stated:

Seeing students at graduation, if you ask them what sticks in their mind and is the most important part of it, it is the IBL placement. And this even outweighs the money of the scholarship and if you actually really squeezed students, the vast majority would do it without the money. (Deakin, 2006, staff member 2)

The important consideration is that decisions regarding remuneration are made in ways that are transparently fair to both students and the industry and, where different levels of payment are inescapable; students are aware of the underlying reasons and feel they are being treated equitably.

CONCLUSIONS

A fundamental strength of industry-based learning, wherever situated, is that it is provides authentic experience: "It is not derived from what other people have told you, you know it for yourself" (RMIT, 2006, Student 1). For us, and many others involved in such cooperative learning, its value is non-contestable. The contested space is how this is organized to maximize the participants' learning. Our argument is that what constitutes 'best practice' is a constructed and contextualized phenomenon, in that it is composed of, and framed by, the varied perceptions and aspirations of the stakeholders. Hence the IBL experience can be organized in multiple ways. It needs, however, to suit the culture in which it is placed and those responsible for decision-making need to be aware of the varied perceptions and aspirations of the stakeholders, what the possibilities of meeting these are, and the implications of making certain choices.

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APPENDIX A

Industry-Based Learning Models Studied

University	Degree	Mandatory/ Optional	Timing	Duration	Remuneration
Deakin	B Business IT	Mandatory	Semesters 5 and 6 of an 8-semester accelerated program	Two 16/17-week placements, normally at two different sites	Students receive a sponsor organization-provided scholarship for the duration of their degree studies
RMIT	B Business (Bus IS)	Mandatory	Year 3 of a 4-year program	One placement of 12 months, usually at a single site	Students are paid a salary by the sponsor organization while on IBL
Swinburne	Various Bachelor Degree Programs in IS/IT/ Computing	Optional	Optional additional 1 year normally taken following completion of year 2 of a 3 year program	One placement of either 6 or 12 months, usually at a single site	Students are paid by the sponsor organization while on IBL
	BIT	Mandatory	Semesters 4 and 7 of an 8-semester accelerated program	Two 20-week placements, usually at two different sites	Students receive a sponsor organization-provided scholarship for the duration of their degree studies

APPENDIX B

Data Collection Profile

	Stage 1	Stage 2	Stage 3
Period of research	2002-2003	2003-2004	2006-2007
University	Deakin	Deakin	Deakin, RMIT & Swinburne
Interviewees [students]	8 graduating students from the first cohort		10 final year students who had completed IBL from the three universities;7 graduands in employment 2-4 years from the three universities
Interviewees [staff]	13 academic teaching staff		8 academic teaching staff from the three universities; 2 coordinating/administrative staff from RMIT
Interviewees [industry mentors]		10 industry mentors	
Interviewees [other]		1 member of a relevant professional association; 1 member of University executive	
Surveys	8 graduate students; 24 IBL students		

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The Asia-Pacific Journal of Cooperative education (APJCE) arose from a desire to produce an international forum for discussion of cooperative education issues for practitioners in the Asia-Pacific region and is intended to provide a mechanism for the dissemination of research, best practice and innovation in work-integrated learning. The journal maintains close links to the biennial Asia-Pacific regional conferences conducted by the World Association for Cooperative Education. In recognition of international trends in information technology, APJCE is produced solely in electronic form. Published papers are available as PDF files from the website, and manuscript submission, reviewing and publication is electronically based.

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