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Staff perceptions of the role of technology in experiential learning: A case study from an Australian university

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This paper reports on a cross-disciplinary comparative study that examines the interplay between information and communications technologies (ICT) and experiential learning, in the context of seven fields of professional practice in undergraduate education. Our central claim is that academic teachers' framing of the meaning and nature of experiential learning shapes the actual and possible uses of ICT, in supporting the development of professional expertise in academic and workplace learning environments. Implicit in teaching conceptions and practices is an underlying view of the changing nature and conduct of the professions, and the requirements for effective entry level practice in relevant professional fields. The paper explores key indicators of ICT development and usage in supporting the creation of meaningful professional learning, and the design of integrated, coherent, professional learning environments.

Introduction

The pervasive impact of information and communications technologies (ICT) on all aspects of the higher education sector is well recognised. Along with this, the sector has been concerned with enhancing graduate employability through the development of generic student attributes desired in the workplace. There has been increasing emphasis on achieving these attributes through closer integration between academic and workplace learning. Experiential learning, so situated, has been conceived as learning occurring in actual workplace environments (Boud & Solomon, 2001). These trends reflect intensifying competition amongst universities in globalising and expanding marketplaces where virtual learning spaces are becoming a major area of contestation. Fundamental, we believe, is the positioning of universities, their roles and contributions, in the context of

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the emergence of global knowledge economies, and the demands of these economies for new forms of professional capabilities required and supported by ICT (Grosjean, 2003; Pittinsky, 2003).

These trends accentuate the need to consider new types of designed learning environments as highlighted in the 2002 Federal Government review of higher education:

> Mass higher education means a different sort of higher education system, with different parameters and expectations for students, academics and the community. It requires rethinking the design of learning experiences and courses, teacher-student contact, and the role of the academic. It necessitates re-examining the way courses are delivered, the implications of institutional policies and practices and recognising that systems of support for learning are as important as the delivery of subjects and courses (*Higher Education at the Crossroads: A Review of Australian Higher Education*, 2002, p.5).

Reflecting on these developments in our own university, we wished to re-examine previous work on pedagogical encounters with what we conceptualised as the technology imperative: see Holt and Thompson, 1995; Thompson & Holt, 1996. In particular, we believe it is instructive to look at the contemporary context of the role of ICT in supporting experiential learning pedagogies for developing professional expertise deemed important for contemporary workplaces and lifelong learning. Both experiential learning and ICT have long traditions of theorising and practice. However, much less research has been published on ways in which ICT can broaden and enhance experiential learning.

This paper examines the interplay between the two in the context of seven fields of professional practice and through the perspectives of academic teaching staff involved in the leadership and teaching of these fields at the undergraduate level.

Context: Integrative developments in teaching, learning and technology

Deakin University has a long, distinguished history in distance education and postgraduate professional education programs offered at a distance. A strong commitment to experiential learning underpins these programs. The educational philosophy has been to create learning resources supportive of the integration of study/theory with work/practice to develop and enhance professional conceptions and practices through the cyclic learning activity of experiencing-reflecting-theorising-experimenting (Kolb, 1984). The commitment to the critically reflective practitioner has been a major intellectual factor shaping creation of curricula, pedagogies, assessment approaches, learning resources and communicative, collaborative forums.

The University adopted flexible learning as a strategic descriptor of its attempts to apply distance education philosophy and practices more broadly to enhancing on campus, undergraduate educational experiences (Holt & Thompson, 1995). Moreover, the University's recent teaching and learning development plans emphasise the need to use experiential learning approaches to expand the range of work experience, community work or service schemes, clinical placements, internships, international experiences, and practica throughout the undergraduate program. The importance of developing generic or transferable skills as part of the undergraduate experience has been highlighted nationally and internationally (see, eg, Candy, Crebert & O'Leary, 1994; Gibbs, Rust, Jenkins & Jaques, 1994; *Learning for Life Final Report*, 1998).

There is a voluminous literature on the interrelated, overlapping areas of experiential learning, adult learning, self directed / autonomous learning and professional learning (eg, Argyris & Schön, 1982; Schön, 1987; Marsick, 1987; Boud, 1989; Boud & Walker, 2001). There has also been much debate around desired competencies, capabilities, and expertise domains of entry level graduates to professional practice. What appears to be generally accepted though is the need to bring into much closer alignment the two worlds of academic study and practice based learning. As Boud (1989, Foreword, p.6) concludes:

> Increasing numbers of teachers and practitioners of all kinds are realizing that the polarity between the intellectual and the practical is an absurdity which can no longer be supported and that we can only progress if we accept that thinking and action are entirely complementary.

What is the role of ICT within this broad domain of teaching and learning concerns? Some literature focuses on the use of simulations within the higher education environment to supplement workplace learning (eg. Canyon & Podger, 2002; Cassidy, 2002; Segrave, 2003a, 2003b). Other work has looked at authentic, workplace oriented learning activities to improve professional capabilities, but these have also been carried out within the university environment (eg. Bennett, Harper & Hedberg, 2002; Herrington, Oliver & Reeves, 2003.) It appears less research has focused on directly connecting ICT with experiential learning in the workplace. Cantor (1995) conducted a review of the literature on experiential learning in higher education in which he discussed ways of linking classroom and community for economic benefits. However, he did not explore specific uses of technology to facilitate these linkages, which suggests, at that stage at least, there was little substantive literature in the area.

In 1999, the *Journal of Experiential Education* produced one issue containing four articles exploring the pros and cons and possibilities associated with technology and experiential learning (Hester and Hirsch, 1999; McCarty,

1999; Stringer, 1999; and Glover, 1999). More recent volumes of this journal have not focused on the topic. Work by Boerner (1999) suggested technology can be used to enhance experiential learning in three ways: "recording the experience for later reference, creating a virtual community of participants (students, agencies, etc.), and enabling new avenues for the community to reach its goals" (p.1). He detailed a number of enabling technologies and services that could facilitate these outcomes. Use of online learning communities is probably one of the most common ways of linking students with workplaces. For example, Lockyer, Patterson, Rowland and Hearne (2002) studied the way online learning was used to help establish communities of professional practice. However, there is scope for more work to realise the potential of technology use for enhancing experiential learning.

In line with most other universities, Deakin has established an enterprise based technology environment for large scale enhancement, *inter alia*, of the learning experience for students undertaking formal on campus professional studies and relevant professional workplace learning. We are still at the embryonic stages of seeing and realising the potentials of corporate technologies in creating and maintaining enduring value for teachers and learners (Holt & Segrave, 2003). However, many Deakin developments have exemplified constructivist approaches to learning with technology. Constructivism embodies the attributes of experiential approaches for meaningful learning. Jonassen, Peck and Wilson (1999, p.201) believe computer supported constructivist learning environments should engage learners in active, constructive, intentional, authentic and cooperative learning. Moreover, they suggest technology roles for (experiential) valued learning must encompass:

- Technology as tools to support knowledge construction
- Technology as information vehicles for exploring knowledge to support 'learning by constructing'
- Technology as context to support 'learning by doing'
- Technology as social medium to support learning by conversing
- Technology as intellectual partner to support 'learning by reflecting' (Jonassen *et al.*, 1999, p. 13).

These strategic initiatives, now characteristic of much organisational activity in universities, have placed a renewed focus on developing relevant, meaningful, professional expertise in school leavers, and off campus, mature aged students not already practising in professional areas. Today's students need to engage with learning environments supporting well-grounded conceptions and practices that allow them to adapt and excel in ever changing professional worlds. This new educational development challenge of designing and working within contemporary

flexible, online supported learning environments has been highlighted by Segrave and Holt (2003).

Research aims, methods and foci

The research reported in this paper aimed to:

- ascertain staff perceptions of the nature of experiential learning;
- identify existing experiential learning practices focusing particularly on the strength of integration of study / theory and work / practice within the curriculum;
- ascertain various ways in which flexible, online experientially based approaches are being used to help develop professional expertise;
- extend exploration from the case studies as to how ICT and experiential learning might be brought together in support of effective practices in different stages of professional and continuing education.

Initially, two rounds of interviews were held with 8 individual staff members. All were involved in coordinating and / or teaching aspects of the programs relating to experiential learning. Some of these staff were actively involved in developing and using ICT in support of experiential learning either in simulating or supporting actual work placement type experiences, for example, in IS / IT, journalism, and nutrition and dietetics. Other staff interviewed in areas like construction management, nursing and teacher education, while demonstrating leadership in overseeing experiential learning in work placements, where less involved in using ICT to replicate or support such forms of experiential learning. This is not to suggest, however, that they were not involved in developing and using ICT to support experiential learning in on campus contexts in contributing to developing the professional expertise of their students.

Reflecting on the interview data, the research team decided to interview two additional staff (5b and 9b) who had specific interests and perspectives around the concerns explored in the Round 2 interviews. These two staff brought further perspectives to the use of ICT in support of experiential learning relevant to work placements and enhancing professional expertise. Table 1 outlines the professional fields, associated courses, the 10 participants and interview round involvement.

The first round of interviews concentrated on procedures and existing data about work placements while the second round sought perceptions of experiential learning and its role in particular disciplines (Table 2).

Table 1: Professional fields, courses, participants and interview round involvement

Professional field	Course	No. of staff interviewed	Interview Round Round 1 = a Round 2 = b
Construction Management	Bachelor of Construction Management	1	1a and 1b
Information Systems / Information Technology [IS / IT]	Bachelor of Information Technology (Honours)	1	2a and 2b
Journalism	Bachelor of Arts	1	3a and 3b
Nursing	Bachelor of Nursing (Preregistration)	2	4a and 4b 5b
Nutrition and Dietetics	Bachelor of Nutrition and Dietetics	2 (together)	6a and 6b
Social Work	Bachelor of Social Work	1	7a and 7b
Teacher Education	Bachelor of Education	2	8a and 8b 9b

Table 2: Major foci of interviews, Rounds 1 and 2

Round 1	Round 2
• Description of nature, organisation and administration of work placement scheme • Student preparation for work placement • Existing student feedback on relevance of work placement to profession • Existing employer feedback on relevance of work placement • Description of role and use of ICT in course • Description of flexibility in course • Process of decision making related to ICT use and flexibility • Rationale for flexible, ICT based strategies • Known benefits of flexible and ICT based strategies • Existing evidence of impact of course on student attributes and future employment	• Conceptions of experiential learning • Role of experiential learning in course • Characteristics of successful experiential learning • Valued forms of professional expertise • Professional expertise and graduate attributes • Desired forms of professional learning • Flexibility and ICT contribution to professional learning • Integration of academic and work based learning • Ideal role of flexibility and ICT in professional development

The research issues are broad and integrated and our investigations revealed a diverse range of flexible, technology mediated learning environments supporting experiential learning approaches across our

University. For this article we have concentrated on staff perceptions of the role of ICT in supporting experiential teaching and learning, some of its inherent flexibilities, and experiential learning embodied in various physical and, indeed, virtual forms.

Research findings

Conceptualisations of experiential learning

The way experiential learning is conceptualised frames the experience for both educators and students. Significantly, the educators we interviewed had different understandings of where experiential learning was located and what it entailed. At one extreme, it was confined to the workplace. At the other, it was seen as occurring in any environment where experience was brought to bear. For some the activity was stressed: it was seen as learning by and through doing with a strong emphasis on action and application —"Students learning how to do something by experiencing it/doing it (Interview Journalism 3b)". While this was seen as important, others wanted to stress the role of critical reflection — "There should be an element of critical reflection to bring out how the task or problem impacts on the students' understanding of the way things work in relation to the discipline" (Interview Social Work 7b). Our research indicated staff had significantly different perceptions, even within the same discipline area and teaching at the same campus. For one lecturer in the School of Nursing it was "connecting their learning to real life situations". For this lecturer, experiential learning is about practice and process and not restricted to the clinical fieldwork experience:

> We draw on the students' experience when we work through problems. We particularly use experiential leaning in the laboratories (our skills based labs). We draw on experiential learning in every day problem solving in the units. We put it in a context, pose a problem, get them to work through the problem, analyse it, come up with some aspects they wish to learn about, go a way and come back and clarify them. That is the basis for our experiential learning. (Interview Nursing 4b)

In contrast, another lecturer confined experiential learning to learning that occurs in the professional environment and deliberately separated it from the learning within the university:

> Within the School of Nursing experiential learning is best described as an extension of on campus learning. So for me that term implies the field experience is putting them in an educational situation that's in a different arena, that is meant to be an extension of their on campus learning, and that's where they can apply their learning to real situations as opposed to on campus where they apply their learning and develop their learning on the basis of reality based situations but they are not authentic in that the

> students are not actually submerged in the situation. The authentic nature means they go out into the actual environment, the professional environment. (Interview Nursing 5b)

Similarly, from the Faculty of Education, perceptions differed. While both lecturers focused on active learning, for one it was confined to the workplace, for the other the university classroom could also be the learning site:

> [It's] active learning, learning on the job, practical training, experiencing the practice of the profession you are entering. The practice of teaching is the most important part of learning to teach. (Interview Teacher Education 8b)

> It's about learning through experience, learning by doing. It's about experiencing on a broad scale, not only during the practicum, but also in the university classroom. Experiential learning occurs all the time in many ways. (Interview Teacher Education 9b)

A recognised attribute of experiential literature as theorised and practiced is its cyclical nature (see, eg, Boud, Keogh and Walker, 1985). Once this is accepted, it appears reductionist to conceptualise experiential learning as bounded by the practicum, the fieldwork, or whatever term is used to describe direct exposure to, and involvement with, the professional world in that space. While this is unarguably the core of the actual experience it cannot be assumed the learning inevitably occurs in this space or at that time. Although students are likely to achieve some level of understanding through the workplace experience itself and at that time, for that learning to be strengthened and deepened, for the perceived fact of the experience to be analysed and interpreted, structures are required that allow students to gain deeper levels of insight and richer perceptions. As one lecturer contended:

> It is best when students are not left to sink or swim – they need to receive guidance. They need 'scaffolding' to know what to do. The students need to feel it (the fieldwork experience) is relevant to what they are aiming to achieve with their education. When these connections (between theory and practice) are made there tends to be a greater interest in what they are doing. (Interview Social Work 7b)

Linking conceptualisations of experiential learning with attitudes towards technology

This study indicated that the way experiential learning is conceptualised is an important driver for how technology will be employed. Where, for instance, the model of experiential learning is an elective, where students arrange their own work experience in a non-structured program and where staff do not visit the workplace or have any expectation of communicating with students during this period —"They can do what they like"

(Interview Construction Management 1b) — there is no obvious role for online communication. This is not to say technology is disregarded. In this example, advanced IT is recognised as important for the profession to the extent that a new unit has been introduced to the course (IT for the Construction Industry). However, it is seen as separate from the experiential learning bounded by the workplace experience. In a second example, where lecturer involvement is minimal and where the online environment has been "allowed to happen more than anything" (Interview IS/IT 2b), online conferencing has a limited role, enabling students to ask questions of peers and keep in contact with other students during the extended period of placement.

When these models are contrasted with experiential learning that is compulsory and 'embedded' in the teaching of the discipline, and where staff actively engage with students and their field educators with an emphasis on critical reflection within a constructivist paradigm, it is evident that although the same technology (online conferencing) is employed, it will have a very different role. In this case communication is critical and learning in the professional space is connected with learning in other spaces through the use of online conferencing:

> They are checking in daily asking questions, posing problems. Our first online tutorial is about safety issues in their placement. Students need to share their results online so students can benefit from the ideas that come from a huge range of agencies rather than just their own. More powerful is the spontaneous things that come from their experiences. For example, a student who has just started placement in a prison is talking about 'lockdown' and this brings up the issues of jargon and culture. As an educator I can draw this out to talk about the language at the placement. When students talk spontaneously about their placement this comes through. They can raise issues from the day's work. It fosters collaboration between the students. It is an excellent vehicle for this. (Interview Social Work 7b)

In contrast to students being left to resolve problems by peer support with no lecturer intervention (Interview IS/IT 2b), this Social Work lecturer uses the student comment on the experience to shape the teaching - in this instance, to talk about the language at the placement. This is similar to the situation in Nutrition and Dietetics:

> We encourage them to share experiences through a discussion site. We moderate that site. They keep their reflective journal on email. That is great because you can give an immediate response. If there is something really fascinating we might say, 'Can we share that with the class?' If there is a whole theme coming through we can raise the issue without breaking confidentiality. (Interview Nutrition & Dietetics 6b)

These educators have sought ways to encourage their students to reflect on the experience and to enrich their learning by sharing insights with peers and mentors and technology has enabled this.

There are, however, clearly different views about the role of online discussion during the actual time in the professional space. For one lecturer in Education, who has been immersed in technology for many years, there is a danger in "using technology at every turn" (Interview Teacher Education 9b). He argued:

> Having a discussion group for students while they are on practicum is pie in the sky. Why should they do that? They are too busy. And there's got to be a good reason. Assessment is not a good enough reason – they've really got to be fired up with this. … When they're out in schools giving lessons and writing lesson plans I don't want to know them really unless they've got some real problems. And then they can come and see me or contact the school office. They are really happy when they're out there – they consider it the real part of their teacher education. So let's not try and interfere with that – that's good stuff. (Interview Teacher Education 9b)

His caveat, that if they have 'real problems' they have ready face to face contact, is important as this is not the case for many students who are away from the University in the workplace situation. Similarly, another lecturer, who believed it was "absolutely essential" that there was part of the day when students could reflect on their field experience in a supportive, non-judgmental environment, found online conferencing unnecessary for his students as their workplace experience was supported by a face to face debriefing at the end of each day with the facilitator plus a tutorial based debriefing at the end (Interview Nursing 5b). Hence an element that cannot be disregarded in our understanding of the role of technology is the context in which the experiential learning occurs.

What became apparent from our research is that, for those who characterise experiential learning as occurring exclusively within the domain of the professional workspace, the role of technology is inevitably constrained. While there was one clear exception, our research indicated that this may also be attributable, at least in part, to a recognised and confessed ignorance of what technology can offer.

> My knowledge of online learning is very limited. … I don't know what role technology plays beyond students have a knowledge of the use of technology to enhance their teaching and learning (Interview Teacher Education 8b).

> We are still feeling our way with this (Interview Construction Management 1b).

Given the University's encouragement of staff to engage with online learning, it can be assumed that it is not the predilection of these lecturers to engage with such technology. At the same time, they are likely to value the face to face immersion in the field as pre-eminent in value, and, where technologies are introduced or contemplated, they are seen as support for that experience:

> I guess the online component could be a supportive structure amongst some other supportive structures when they're in an environment that's a learning environment that's somewhat alien to them. (Interview Nursing 5b)

> They (students) are able to use technology through online methods. So if they have a problem they can go online and tell their fellow students and seek advice. … We have found that to be a great method for adding to what they are learning. (Interview IS/IT 2b)

But there is a cost here. Until lecturers are prepared to engage with technology, to explore its possibilities, to look critically at what can it offer to enhance all aspects of teaching and learning, including experiential learning, then lack of awareness of what technology can offer shuts off possibilities. As one lecturer (Interview Teacher Education 9b) argued, "We've got to experience the technology rather than shy away from it. We've got to allow ourselves to go into it. Unless we do that students will shy away from it or some will do it in spite of us".

In contrast, for those who conceptualise experiential learning beyond the fieldwork, or its equivalent, and who are open to the exploration of ICT, technologies offer rich learning opportunities. In Journalism, for example, where staff contend experiential learning is the basis of this vocationally oriented course, and where opportunities to engage with the practicalities of the working life of the journalist —"to practice and practice"— underpin the course design, the lecturing staff draw on their professional experience to develop and present a skills based course and arrange to have people from the industry talk with students. Technology has been used to capture some aspects of this approach. For instance, a video on interviewing gave the best tips from journalists from the newspapers. Efforts have been made to replicate the work environment as closely as possible through an award winning CD, "Hot Copy: a virtual newsroom":

> HOTcopy® offers a virtual practicum in print media journalism, inviting immersion in a series of interactive, real time simulations of workplace scenarios. Consistent with situated professional practice, work assignments are set and emerge while interventions from scenario characters add new challenges and deadline pressures. Taking on the roles of reporter or sub-editor, learners analyse information, make judgments, reflect on actions, receive feedback on decisions and try to finalise 'copy' on time. (Segrave 2003b, p.1.)

Based on scenarios scripted from real events, students are required to work within a tight time frame with industry pressures built in. While praised as authentic by the industry and teaching staff who, themselves, have professional journalism experience, there is a recognition that "you are never going to be able to replicate what happens in the newsroom" (Interview Journalism 3b). HOTcopy provides a start. It sensitises students to work conditions, assists them to explore important legal and ethical issues and gives them the experience of producing copy to a deadline. It foregrounds the professional world through the scenarios but it cannot replicate that world with its complexity and nor should it. The strength of its contribution to learning is it provides a staged development for students, giving them vital prior knowledge and experience prior to their direct industry experience. In so doing it should mean the workplace experience is of greater value to these students as they have more securely grounded expectations.

A further dimension for some educators is that technology is seen as a way of opening up possibilities to improve the supervision in the workplace. When considering how the development of professional expertise could be enhanced in their program, there was recognition of how technology could enhance the nexus between the University and the workplace:

> I would love to develop online resources for our field educators. Being an educator and being a social worker are two different things, so there is a whole discourse of assessment, being a role model, being a mentor, encouraging professional development which is part of being an educator but is not part of being a social worker. I would like to develop a site of professional development online for the social work field educators. They could supplement what they do with the students. We would be a community resource to those people. We are trying to improve the quality of the supervision. (Interview Social Work 7b)

Finally, while, as discussed above, staff working within the same discipline held different notions of what experiential learning entailed, the nature of the discipline remains influential regarding how technology will be viewed. "You can't be a journalist and not understand technology" (Interview Journalism 3a) claimed one lecturer and, even more obviously, for students involved with IT the very nature of the professional experience will be technology grounded. We found the more nurturing professions (Nursing, Social Work and Nutrition and Dietetics) were more likely to value the use of ICT to provide personalised channels of communication between academic teachers and their students as they experience their work placements.

Limitations of ICT to provide and support experiential learning

If there is a perceived and then demonstrated need for ICT to be used when experiential learning is involved, it cannot be assumed that such interventions will inevitably achieve the desired learning outcomes.

If there is a problem in accessing these materials and there is a lack of understanding of their role, then such materials are unlikely to be well-received. Lecturers in Nutrition and Dietetics postulated that a series of case studies drawn directly from the profession on CD would allow students freedom to gain knowledge of issues in key areas. They found that students preferred the face to face interaction of talking about these within a group.

In Nursing originally there was a 'backlash' from the students as they, with some of their lecturers, believed online learning would cut face to face contact (Interview Nursing 4a). For the lecturers who were involved in the conceptualisation and development of the material there was greater ownership and acceptance, while for those who saw the movement to online learning was 'by edict', with the lecturers' role enacting policy determined elsewhere, there was a tendency to question and diminish the role of online materials. When this was coupled with technical difficulties and access problems a well-conceived and developed unit was arguably unsuccessful for some cohorts of students (Rice & Bowly, 2001). More recently, where there is a perceived 'softening' in policy and there is not the same perception that the stimulus for their adoption is cost cutting through staff replacement by technology, and the access problems have been resolved, there is a different staff and student reaction to these materials which are now 'well received' — "Online learning works well when students [and staff] see that IT is supplementing their learning. If they see it as replacing face to face teaching it is an uphill battle**"** (Interview Nursing 4a).

Where simulations are introduced, it cannot be assumed that students will use them as originally intended to engage with 'real world' situations. Segrave (2003c, p.2) challenges us to think beyond the media components to the nature of the engagement with the learning environment:

> While audio, video and multimedia can present the 'appearance' of real events and contexts, and reception of these is an experience, active engagement in the authentic world (as represented) may not be evident.

There is a tension between those who would use technology to simulate the professional experience, to replicate that world as closely as possible, and

those who would use technology to replace that experience. The lecturers we interviewed saw the CDs and online programs as giving students opportunities to engage with 'real world' scenarios and issues, to hone skills in a protected environment, but consistently advocated that the actual experience of the workplace was essential.

> CD ROMs are used to assist the student to understand some of the theoretical components behind the skill. It doesn't replace the hands on. … Because Nursing is a humanistic experience or profession I wouldn't like to see it [de]void of human contact. That would be a huge worry. (Interview Nursing 4b)

> We show them stuff we have done (through videos etc) but it is never the same as going out to the real world … Some students find they love it out there and others don't like it at all. They only find this out by going into the workplace. (Interview Journalism 3b)

> I don't think anything can completely prepare them other than going out and seeing real people. … They really need to experience the environment. (Interview Nutrition & Dietetics 6b)

We contend that recognising the limitations of ICT in this regard is a strength. It should play a support role, and, within this construct, its possibilities can be usefully explored and hopefully realised.

Key indicators of educational technology effectiveness in supporting experiential learning

The comparative case study analysis suggests six broad indicators of the potential effectiveness of educational technologies in embodying or supporting diverse forms of experiential learning. These indicators, while grounded in the case study analysis, extend more broadly as an agenda of questions to prompt greater thought and creative lines of action about possibilities and constraints.

Broadened conceptions of the meaning and purposes of ICT and experiential learning

We studied the realities and possibilities of using ICT to support experiential learning for professional education at the undergraduate level. This raised the question as to the meaning and purposes of ICT and its relationships to experiential learning. We surmise that there seems to be a continuum of forms of experiential learning ranging from engagement with the physical world of workplace practice to immersion in simulated, virtual campus based worlds for professional development. Dichotomous thinking around what could count as experiential learning may close off possibilities for ICT to play multiple roles in experiential learning for

professional development. What becomes important is a judgement about how different types of experiences from the individual to the collective, the real to the virtual, the campus to the workplace, and the myriad combinations thereof, can make different, but self reinforcing, contributions to professional capability development.

In this regard we note the fusion of the virtual and physical in the globalising worlds of work where so much of the 'real' work is undertaken in virtual spaces. This is being increasingly paralleled in physical campus based academic learning settings through virtual learning spaces. Intersections between these academic physical/ virtual and practice based physical/ virtual settings seem like fertile ground for the use of ICT supported experiential learning, based on our case study analyses.

Broadened application and integration of experiential learning

In order for ICT to play a more central role in experiential learning, it may well be argued that experiential learning itself must be centrally located in the contemporary professional curriculum with its academic and workplace learning dimensions. Designing for ICT enhanced experiential learning requires, we believe, a more encompassing view of the fundamental challenge of designing learning environments, both physical and virtual in nature, supporting student learning in various contexts from the on campus classroom to the actual workplace. While some of our case participants may have argued otherwise, we do not wish to see too sharp a line drawn between what does, and does not, constitute experiential learning, particularly in ways that restrict the design of virtual simulation environments that allow students to be initiated into the ways of thinking, feeling and acting in the professional field, before actually experiencing the realities and complexities of these real worlds. However, we believe the efficacy of such virtual worlds of professional apprenticeship should be judged against appropriate quality design considerations. We need to think beyond the media components of such simulations to the nature of the engagement with the learning environment.

Designed ICT supported experiential learning environments at program level

For experiential simulations to play a pivotal role in professional preparation they must be situated as major flexible learning resources throughout the key stages of professional development, and this is illustrated through the Journalism case and its focus on the simulation, HOTcopy. This might also encompass related postgraduate studies

(Segrave & Holt, 2003; Segrave 2003b). The potential for re-usable learning objects constituting different simulation scenarios as virtual practicum complementing actual workplace practicum seems high. This requires a programmatic focus in curriculum design and learning resources development. Moreover, possibilities for experiential learning in all its forms in the curriculum are further enhanced through phased integration of workplace learning at different academic curriculum levels/stages, as illustrated in the Teacher Education and Nursing cases. We believe the integration of workplace learning throughout the academic learning experience provides the best opportunities for students to develop their professional capacities through cyclic processes of experiencing, reflecting, theorising and experimenting.

Pedagogies and online applications for experiential learning

The cyclic, transforming nature of experiential learning implies a continual engagement of academic and practical learning. Student learning needs to be incremental. For students to act as competent professionals in the workplace it is essential they have a repertoire of skills developed over time. Conversely, for students to gain sophisticated understanding from complex workplace environments, we need to draw that applied experience into the learning domain of the theoretical academic environment. This drawing together of learning in academic and practice worlds can be enabled through use of electronic portfolios and journals as tools of reflection and knowledge construction in virtual environments. The virtual domain becomes an important integrative bridge between university and workplace, and, more specifically, between key parties in the educational experience — academic teachers, support staff, students, workplace mentors, and significant others in the workplace. While a short, one off workplace learning experience may be beneficial in the academic curriculum, particularly as a capstone experience near the end of a course, it is where extensive and phased workplace learning experiences are central to the professional curriculum that learning through experience will be most powerful. The centrality of workplace learning, in turn, provides the most significant opportunities for ICT in the designed learning environment.

Extending from the case analysis, we see contemporary professional curricula as being characterised by integrated treatments of theory, practice based preparation and work placements. ICT can in turn play a central role in supporting students' engagements with a range of traditional and digital learning resources, and people in their universities and workplaces, as a major area of enduring teaching and learning made possible by new e-

learning technologies (see Holt & Segrave 2003). As part of this learning environment philosophy, ICT can be used to bring professional experiences in the workplace in real time back to the academic classroom to enrich on campus teaching and learning, as was illustrated by the interview with one of the teacher educators who saw the value of ICT in experiential learning from conveying workplace experiences to on campus academic learning enrichment, rather than using ICT from the university to support students while they were on their actual teaching practicums.

In a world of work increasingly emphasising online training for corporate employees and education of students by e-learning, the 'real' experience of the profession will involve practising effectively online. Such environments can also allow a broader range of educational parties, internal and external to the University, to bring to bear different enriching perspectives on students' professional development, although our case analyses reveal a diversity of views and practices on how this might be effectively undertaken in bringing together ICT and experiential learning.

Extending experiential learning environment design across fields of professional study

While our cases focused on ICT and experiential learning at the undergraduate level, questions are raised about the such experiences as preparation for developments in postgraduate and continuing professional education. With ICT integral to the work environment, we see the need for professional practitioners to use ICT to further maintain and enhance their professional capacities. This will be imperative for professional practitioners who practise in rural and remote locations at a distance from industry supervisors / mentors, and campus based teaching support, as was illustrated in the Social Work case. Whatever the uses and impacts of ICT supported experiential learning for professional capacity development at undergraduate level, it seems that further down the professional development path, practitioners will increasingly be using ICT to support their ongoing professional development.

In anticipation of the importance of ICT in continuing professional education, we believe thoughtful, though differing, commitments to ICT supported experiential learning should be coherently designed into undergraduate professional programs encouraging IT and information literacy, and various forms of online communication and virtual teamwork. These skills would seem essential for the evolving knowledge based, networked organisations of the globalised economy.

The learning organisation in designed ICT supported experiential learning environments

What, then, is required within the organisation to enable the effective use of ICT for experiential learning which is a key consideration in examining the cases and their implications for more effective practices? We believe a holistic systems approach to the design of learning environments, coupled with vision, leadership, trust, encouragement, reward, facilitative structures and continuity of action, are all important attributes of the type of learning organisation required to maximise the possibilities of ICT in, and for, experiential learning. Leadership vision is needed to see the possibilities of using ICT to support differently designed experiential learning environments conducive to professional capability development at the key stages of academic study and practice. The systems approach helps leaders and academic teachers to see the interrelationships between unit, year level, course and professional development designs. Units and courses need to be conceived as part of the whole professional field of study design, and the larger whole as enacted through each of the constituent unit and course parts.

Academic teaching staff must find the vision of field of study experiential learning environments believable and beneficial to their own parts of the larger picture. There are time and effort costs in designing and working within ICT supported experiential learning environments. Staff need to feel they can trust their leaders to reward them for strong commitments to creating such environments and leaders, wherever possible, should demonstrate similar commitment. Greater emphasis should be placed on connecting ICT potentials with the other areas of curriculum design, pedagogy, assessment, and research and evaluation of impacts on teaching and learning. Progressive roll out of effectively designed environments over broader fields is not done easily or quickly, and requires determined continuity of action. Finally, new forms of academic collegiality, involving a broader range of constituencies contributing to students' professional development both inside and outside the university setting, need to evolve. These should span key areas of experiential learning environment design covering whole fields of professional practice.

Conclusion

Our study demonstrated that technology enhanced the workplace experience in two major ways: through strengthening the learning during the time students spent in that space through online conferencing, and for preparing students more effectively to work as professionals by bringing the experience of the professional space to the academic environment.

Conceptions of the purpose and role of experiential learning in the curriculum seem crucial in shaping ICT possibilities. Moreover, the study reveals that conceptions of curriculum purpose and role, intended learning outcomes, balance of focus between academic and workplace learning, and the underlying teaching and learning environment, all contribute to determining the impact of experiential learning in developing professional capabilities. The power of ICT supported experiential learning can be enhanced through its grounding in holistic approaches to designing teaching and learning environments for whole programs and fields of professional study. In these broader teaching and learning contexts, ICT can provide and support new learning experiences in multi-faceted ways in diverse learning settings.

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