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Renata Phelps
Southern Cross University

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A CONSTRUCTIVIST APPROACH TO PROFESSIONAL DEVELOPMENT IN ICT LEADERSHIP: CREATING A LEARNING COMMUNITY

Renata Phelps
School of Education, Southern Cross University, Lismore, Australia
rphelps@scu.edu.au

Management of ICT has emerged as a critical issue for schools and one that is impacting significantly on the work of principals and other senior staff. Theory, knowledge, information and even ideas relating specifically to ICT management in school contexts are not yet readily available. Much of the most valuable knowledge and information can be found in the day-to-day experiences and theorising of practitioners. This paper describes the constructivist approach being taken to ICT management through a particular unit in a postgraduate level professional development course at Southern Cross University. It is argued that engaging educational leaders in constructivist learning enables them to reach greater understandings of the potential of technology in challenging and enhancing traditional pedagogy. The structure of the online Unit incorporates eight management themes: policy development, physical resources, financial resources, curriculum leadership, staff development, school administration, leadership in change and future visioning. The way in which constructivism has shaped the Unit design, structure, interaction and assessment are explored, informed by the interactions of a particular cohort of participants in the Unit.

Conference Streams: Professional Development and Change, Leadership and ICT, School management, Online Learning.

Key Words: Constructivism, online learning, teacher professional development, technology management

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INTRODUCTION

> The literature on educational technology is full of glowing promises of dramatic and meaningful improvements to classroom activities and outcomes. But the mere presence of technology is not an automatic guarantee for improved education. Despite its potential power, educational technology has had some well-documented high-profile failures (Roblyer & Edwards, 2000, p.29).

Such a statement will not come as a surprise to the group attending this conference. While there have been significant political and social pressures on schools to embrace technological change, the issues accompanying this change are broad ranging and sound educational outcomes cannot be assumed. Management of information and communication technology (ICT) in schools has emerged as a significant issue for principals and other senior staff in primary and secondary sectors alike. There is thus a growing imperative for school leaders and managers to engage in professional development in this area. As Maurer (1998, p.251) states, 'without effective planning, technology will remain a solution in search of a problem'.

This paper explores one particular professional development opportunity for educational practitioners who are involved with, or interested in, management of ICT in schools. In particular it focuses on the constructivist approach taken to a postgraduate unit titled *Management of Educational Technology in the School Environment* (ISY00552). The paper explores how constructivism can inform and shape the development and delivery of professional development and how such an approach can enhance school leaders' and managers' professional practice.

A LITTLE BACKGROUND TO THE DEVELOPMENT OF THE UNIT

ISY00552 is one of three educational ICT units in the Master of Education (Coursework) program offered at Southern Cross University[1]. The Unit was developed in response to an identified growing need of school administrators for professional development in relation to policy, planning, management and leadership issues surrounding the adoption of ICT in school environments. ISY00552 does not focus on skill development or learning theory (aspects addressed in the first of the stream of units, *Educational Information Technology for the School Practitioner*). Nor does it focus on pedagogical or practical issues surrounding integrating of ICT (the focus of the second unit, *Integrating Information Technology into the Classroom*)[2]. Rather, this particular unit is targeted toward school leaders, managers or other teaching professionals involved in technology planning or management processes.

It is recognised that many of the individuals undertaking this Unit will be employed in school management and leadership positions. In developing the Unit we wanted to acknowledge and emphasise participants' experiences as relevant and valuable and provide opportunity for participants to discuss their professional context, collaboratively seeking solutions to particular workplace challenges. It is also acknowledged that many educational leaders have not had the opportunity to study online or use technology to support their own 'formal' education. Given the growing impact of ICT on primary and secondary curriculum and pedagogy we believe that it is important to provide educational leaders with the opportunity of experiencing technology-based learning first hand. It was thus seen as important to use technology to teach about technology. For this reason ISY00552 was developed as an online unit, supplemented with some print-based orientational materials and readings. We thus hope to provide participants with a taste of how technology can open up a range of learning possibilities, enabling them to reflect on the advantages and disadvantages of technology-mediated learning in their own educational context.

A key influence on the development of the Unit was the scarcity of appropriate texts or appropriate reading material. At the time of Unit development there did not appear to be a well established body of literature relating to ICT management practices in schools, probably given the rapidly evolving nature of the area. Those texts that were identified (Maurer, 1998; Picciano, 1998) were distinctively American and seemed to be aging quite rapidly. While aspects of these references were relevant it was felt that they were insufficient to form a basis for the Unit.

This paper explores the nature of constructivism and demonstrates how constructivism can form a beneficial theoretical underpinning for technology-mediated learning and, vice versa, how technology can enhance constructivist approaches to learning.

CONSTRUCTIVISM AS THEORETICAL FOUNDATION

At its simplest constructivism posits that knowledge is constructed; in other words, individuals make sense of their world by constructing their own representations or models of their experiences (Jonassen, Peck & Wilson, 1999). Knowledge cannot be passively accumulated but is the result of active cognitive processes undertaken by individuals as they organise and make sense of their experiences. Constructivism is founded on the work of individuals such as Piaget, Dewey, Vygotsky, Ernst von Glaserfeld, Kant and Kuhn (Phillips, 1995; Twomey Fosnot, 1996). There are a number of constructivist positions which differ particularly in terms of the relative emphasis placed on the role of the individual versus the 'social' (Bickhard, 1998; Phillips, 1995). Particular 'schools' of constructivism include cognitive constructivism, radical constructivism, situated constructivism and co-constructivism (symbolic interaction or social constructivism). Building on the work of Piaget and Vygotsky, social constructivists believe that knowledge is constructed socially from language and that everyone constructs social experiences differently resulting in multiple realities. Constructing knowledge is a socio-linguistic process where there is gradual advancement of understanding built upon previous knowledge resulting in multiple dimensions of the truth (Kanuka & Anderson, 1999). Kanuka and Anderson (1999) note that each of the 'schools' of constructivism have four central beliefs in common:

- that new knowledge is built on the foundations of previous learning;
- that learning is an active rather than passive process;
- that language is an important aspect of the learning process; and
- that learning environments should be learner-centred.

Constructivism, as a theory of learning, has major ramifications for the goals teachers set, the strategies they adopt and the methods of assessment they use (Twomey Fosnot, 1996). Constructivism might be best understood by contrasting it

[1] Further information about the Master of Education (Coursework) program offered at Southern Cross University, New South Wales, Australia can be found at: http://www.scu.edu.au/schools/edu/masters/

[2] It is not necessary for students to have completed these two units prior to undertaking ISY00552, *Management of Educational Technology in the School Environment.*

with instructivist approaches whereby teachers identify what is to be taught (learning objectives), how it is to be taught (learning sequence and strategies) and determine if the teaching has been effective. Constructivist approaches, however, emphasise the importance of students raising their own questions, generating their own hypotheses and models and testing these themselves. Concepts cannot be taught out of context. Constructivism perceives 'errors' as important sources of learning and reflection and dialogue are seen as the driving forces of learning (Twomey Fosnot, 1996). Teaching is thus *not* about imparting knowledge but about facilitating learning; assisting learners in their own construction of knowledge.

Constructivism is gaining considerable influence in the integration of information technology into educational contexts at primary, secondary and tertiary levels. Jonassen, Peck and Wilson (1999), for instance, demonstrate how technology can be utilised to support constructivist learning. They argue that meaningful learning will result when technologies engage learners in:

- Knowledge construction, not reproduction;
- Conversation, not reception;
- Articulation, not repetition;
- Collaboration, not competition; and
- Reflection, not prescription.

Jonassen, Peck and Wilson (1999) emphasise that students cannot learn *from* teachers *or* technologies but rather students learn from *thinking*; 'thinking about what they are doing or what they did, thinking about what they believe, thinking about what others have done and believe, thinking about the thinking processes they use... technologies can foster and support learning... if they are used as tools and intellectual partners that help learners to think' (p.2).

SO WHAT DOES THE UNIT LOOK LIKE?

The Unit is shaped around the visual metaphor of the 'jigsaw puzzle', emphasising the interrelated nature of the eight management themes. When participants visit the Unit Web-site they navigated between sections by clicking on the puzzle-piece icon associated with each topic.

As participants move into each of the management theme sections they encounter a brief introduction designed to orientate them to the potential breadth of that management theme. This introductory page also provides some *personal context questions* designed to assist participants to begin to think about the theme as it applies to their own school or work context. Examples of such questions included:

- Where are the physical IT resources in your school currently located and how are they arranged? Is this the most appropriate approach? Are physical resources utilised as efficiently and effectively as they might be?
- Are there any administrative functions that might be better managed through technology-based solutions?
- Does your school have an IT Policy? If so, how was it developed? What does it address?
- Does your school readily embrace change? What are the biggest changes your school has recently implemented? What factors affected the success of these changes?

Participants are encouraged to jot down their initial thoughts and reactions to these personal context questions, thoughts that might inform their discussion with other participants, as well as their assessment tasks. Having read this brief introduction, participants move between three sections for each management theme; the *Issues* page, the *References* page and the *Collegial Discussion*.

The **Issues** page provides a series of challenging questions and issues designed to prompt participants' discussion and reflection. It is explicitly acknowledged that some questions will be more relevant to the personal contexts of individual participants than others. Participants can draw from these issues or identify and present their own. They then share their views with others, all the while documenting their developing thoughts and understandings. The **References** page lists relevant reading material, some of which is provided in print format, while other references are online. The references are divided into *Core Readings* and *Supplementary Readings*. The Core Readings are those which are considered as foundational to an understanding of the management theme, while the supplementary readings allow participants to pursue further knowledge which they feel is most relevant to their local context. Participants are encouraged to differentiate between the personal value of 'skim reading' versus more 'in depth' reading. The **Collegial Discussion** is seen as where the 'real' learning occurs. Each of the management themes has its own discussion thread where participants can collectively address the relevant and challenging issues and readings as they relate them to their local context.

One further section of the online resources, the **Library,** provides links to general online literature and resources including journals, conference proceedings and relevant web sites. Participants are strongly encouraged to seek out resources relating to their own local needs and to share these with other participants.

HOW THE UNIT IS INFLUENCED BY CONSTRUCTIVISM

In this section I detail how constructivism informed and shaped the development and delivery of ISY00552. It should be stated that the constructivist foundation to the Unit was made explicit to participants at the beginning of the Unit. Their first reading was that by Kanuka and Anderson (1999). By clarifying and articulating this constructivist foundation it was hoped that participants would reflect upon, and evaluate, constructivism as a foundation to their own and their students' learning. To illustrate the constructivist foundations of the Unit I will draw upon a number of underlying concepts of constructivism and explain how these translated into practice in the Unit's design. These concepts will be shown to have influenced the Unit's content, sequence and structure, sources of learning stimulus, activities, provision of resources, and my role as a tutor.

ISY00552 **veers away from identifying what will be taught or how it will be taught**. Unlike traditional external Units no pre-structured study guide or 'content' has been written to 'guide' participants through what I (as a Unit writer) consider to be important. I do not presumed to know what learners will, or will not, find relevant to their local context. Instead it is intended that learners will shape the Unit content and direction themselves.

ISY00552 acknowledges the **complexity and constantly changing nature of current school management contexts**. Through this acknowledgment it embraces the understanding that there will be no single 'solution' to the complex problems encountered by schools; that there are no "golden rules" for school management and thus no defined body of knowledge that will assist participants to meet all management challenges. Rather, the emphasis of the Unit is on sharing of ideas and experiences, and on collaborative reflection.

Constructivism acknowledges that **authentic or 'real life' learning is neither structured nor systematic**. As previously outlined, the Unit wrapped around eight very broad *management themes*; Policy development, Physical resources, Financial resources, Curriculum leadership, Staff development, School administration, Leadership in change and Future Visioning. These eight management themes provide a very 'loose' structure. Each is seen as interrelated and none is considered to be more important than the others. It is explicitly acknowledged that there is no logical sequence in which these areas might be addressed and that engagement with any one theme will inform and develop understandings of the other themes. Participants are encouraged to move between the various management themes and revisit each one iteratively, rather than start and complete each one in isolation. Within these very broad management

themes, participants are free to pursue content and experiences that they see as most relevant to their own professional context.

Just as in 'real life' learning, ISY00552 acknowledges that **valuable information will emerge from a wide range of sources**, none of which might exactly address participants' issues. The Unit thus draws from a wide range of resources including theoretical, empirical and case-study based literature together with collegial discussion. Some of these resources are provided to participants 'up front', others as the Unit progresses, and others again are shared between participants themselves.

Constructivism recognises that **new knowledge is built on previous learning and experience**. In ISY00552 participants are encouraged to share their past and current experiences with other participants, bringing their prior knowledge to the forefront and enabling other participants to share and learn from their understandings and experiences. To this end, participants are expected to engage in online discussion approximately twice a week and this discussion is seen as the primary point of learning.

Constructivist learning and teaching emphasises the **incorporation of learning activities with real world relevance**. Participants in ISY00552 thus focus on their own personal practice and develop management strategies and plans for their own school context. The assessment in the Unit reflects this emphasis on real world relevance. In assignment one participants are required to conduct an analysis of their school's adoption of ICT, encompassing the eight management themes. They are encouraged to draw on observations, reflections, school documents and discussions with other Unit participants, as well as their reading. Assignment two builds on the learning from assignment one. Participants go on to develop a strategic or practical plan for their school. Their plan can take the form of a strategic document intended for management, including, for instance, general policy directions, financial management guidelines, staff development and change management strategies. Alternatively it can take the form of a more practical 'kit' or series of resources such as policy documents, letters to parents or posters for students, staff development schedules, workshop planning, physical resource layout diagrams etc.

Constructivism posits that **an individual sense of conflict or 'puzzlement' is a necessary stimuli for learning**. As Kanuka and Anderson recommend, learning environments should 'capitalise on inconsistencies'. ISY00552's online discussion prompts participants to share their experiences and to challenge each others' assumptions and practices. Participants are prompted to consider multiple perspectives and learn from each others' experiences and management approaches. As a tutor I often play the role of 'devil's advocate' to challenge participants to consider alternative views.

Finally, consistent with constructivism, as a tutor I see my role as that of a **guide or a coach rather than as a 'teacher'.** My role is to support participants through the Unit, not to impose 'knowledge'. Learners have the responsibility to decide what and how to learn, and in particular of focussing on what is most relevant to their own professional and personal context. I do not see myself as having a greater understanding of IT management issues than the Unit participants, and I certainly don't claim to know what each individual participant will find most personally relevant. Instead I emphasise that as a tutor I bring to the learning context a *different* range of experiences which they might find beneficial to share and reflect on, just as I gained from their experiences and perspectives.

THE STUDENT COHORT

The remainder of this paper will focus on the experience of the first cohort to undertake the Unit in the second half of 2001. This group consisted of eight principals/deputy principals from the Catholic Education sector, two Papua New Guinea based classroom teachers and one Australian-based classroom teacher. The three classroom-based teachers had undertaken a previous ICT-focussed unit in the Master of Education (Coursework) program, while the eight principals had not. The eight principals were from the broad geographical region of the University. They knew each other prior to commencing study and also had the opportunity to attend an introductory workshop where they received the unit materials, participated in an initial brainstorming session and located and become familiar with the Unit's online resources. The cohort was from diverse school contexts; the three classroom teachers were from the primary sector while the principals/deputy principals were from both primary and secondary sectors and from schools of widely variant sizes.

Data are drawn from the online discussions and participants' evaluation and feedback provided after they completed the Unit, together with my own reflections as a 'tutor' working with this cohort.

THE DIVERSITY OF 'CONTENT' ADDRESSED

As was previously noted, the constructivist underpinnings of the Unit veered away from identifying what would be taught or how it would be taught, but rather the content and direction was shaped by the participants themselves. Table

1 summaries the types of issues which were discussed. Notably, the emergent nature of the discussion meant that some issues raised in a particular management theme overlapped with other management themes and thus some slight re-shuffling has occurred in the interests of logical presentation.

Table 1: Issues discussed by ISY00552 participants in relation to each of the eight management themes

Leadership in Change	Human Resources
▪ Need to remain open and excited by change ▪ Questioning change – informed and selectivity critique versus resistance ▪ Ownership of change ▪ Identifying 'change agents' and 'change stompers' ▪ 'Softly softly' versus 'sink or swim' ▪ A 'united front' from executive ▪ Challenging the resistors ▪ Capitalising on the enthusiastic ▪ Dispelling the 'myth' of age ▪ Technology as 'reactive' not 'pro-active' ▪ Awareness of expectations and co-planning between primary and secondary sectors ▪ Pace of change difficult for even those most positive about change ▪ Focus on children, and outcomes for children and on lifelong learning ▪ Issues of intimidation associated with modelling to fellow teachers ▪ School cultures that discourage teacher learning versus schools as 'learning organisations' ▪ Role of the compulsory state-wide basic IT skills testing ▪ Role of politics	▪ Models for professional development (e.g. self-directed learning, subsidising courses, loaning computers, visits to and from other schools, sharing success stories, demonstrations, mentoring and modelling) ▪ Components of successful staff development ▪ Need for professional development (PD) to focus on integration not just skills ▪ Role of 'forced' change ▪ Students driven teacher learning ▪ Equity in PD, even for those not seeking assistance. Also for school leaders ▪ PD regarding integration ▪ Relationship of problem solving to PD ▪ Separate ICT teachers versus classroom teachers ▪ Pros and cons of in-school versus out-of-school 'trouble shooters' ▪ 'Duel role' of ICT coordinators as 'teachers' and 'technicians' – sharing duty statements ▪ Harnessing parents and students as technicians and trouble shooters ▪ Issues of staff 'turnover' and loss of skills ▪ ICT orientation for new staff ▪ Importance of perceived value ▪ Centralisation of professional development and support
Curriculum Leadership	**Financial Resources**
▪ Leading by example ▪ Importance of enthusiasm ▪ Integration versus separation ▪ Scope and sequence of both skills and application ▪ The inability to package computer education into a neat beautifully sequenced document ▪ Centralisation of scope and sequence (including role of Board of Studies) ▪ Dating of curriculum documents ▪ Changing pedagogy – constructivism, authentic learning and problem-based learning ▪ Web-Quests ▪ Role of value-based education ▪ Information versus knowledge versus wisdom	▪ Buying versus leasing ▪ Funding sources ▪ Budget work-sheets ▪ Collaborative purchasing ▪ Financial versus educational driven decision making ▪ Supporting teacher purchasing ▪ Printing costs and alternatives to printing ▪ Inability to isolate hardware purchasing from software and staff development issues ▪ P&C (P&F) fundraising
Physical Resources	**Policy Development**
▪ Design of computer labs including ergonomic issues ▪ Maintenance and servicing ▪ Digital Projectors ▪ Labs versus classroom based computers ▪ Student:computer ratios ▪ Desktops versus laptops ▪ Optimum computers numbers in the classroom ▪ Teacher involvement in resource purchasing ▪ Maintenance through 'computer clubs' ▪ Security ▪ Networking ▪ Role of business and 'multinationals'. ▪ Power supplies ▪ Equitable access to resources ▪ Under-utilisation of hardware ▪ Loan of laptops to disadvantaged families ▪ Making facilities available after school hours	▪ Sharing existing schools policies ▪ Who or what drives policy? Role of government, business, parents and students. Are we being swept along? ▪ Role of classroom teachers in policy development ▪ Importance of pedagogy and curriculum planning ▪ Rate of change and the difficulty in planning. The need for evolving plans with structured reviewing process ▪ Relationship of ICT plan to budget ▪ Policy priorities ▪ Involvement of parents, particularly in creating responsible ICT users ▪ Starting small and building ▪ Equity issues within and between schools
School Administration	**Future Visioning**
▪ Comparative analysis of particular systems ▪ Library systems – data transfer issues ▪ ID cards for students ▪ Finance systems (expense and ease of operation) ▪ Reporting systems	▪ Why future vision? ▪ Aligning ▪ Difficulty of looking too far into the future ▪ Role of technology in supporting multi-age classrooms .

▪ Cheque writing ▪ Timetabling	

SO WHAT ACTIVITIES DID PARTICIPANTS ENGAGE IN?

It was interesting to observe the diverse range of activities which participants undertook as a result of their involvement in the Unit. Several participants from this cohort, for instance, conducted written staff surveys, either to determine professional development or resourcing needs, or in the case of one principal, to determine staff ICT 'achievements'. One of the principals conducted an observational survey of the level of use of classroom-based computers at various points throughout the day, over a period of weeks. He noted significant under-utilisation of classroom-based computers. Such surveys enhanced school leaders' understandings of the 'grassroots' implementation occurring within their school environment. Such activities signify the capacity of the participants to direct their own learning activities in personally meaningful directions when provided with such opportunity as the Unit allowed.

While skill development was not a focus of the Unit, a group of three participants motivated each other to develop Powerpoint presentations for their assignment submissions. For two of the participants this was a new experience, and one which they gained a great deal of excitement and confidence from. After developing the slides they then presented them to the staff in their school. The open and responsive nature of the Unit allowed participants to pursue such diverse presentation skills. A further area of incidental skill development was the involvement of around half of the cohort in a synchronous communication ('chat') session, something, again, which was new for most of them.

Notably, several of the participants copied and distributed selected readings from the Unit to other teachers within their schools, particularly those on IT committees or in other key ICT leadership positions. The influence of the Unit was thus spread across a more diverse group than simply those enrolled in it. Again this illustrated the value which the participants held for the learning which they were undertaking and the relevance of their learning in their own workplaces.

I was particularly surprised at the level of participation in the Collegial Discussion. The frequency and depth of engagement exceeded my initial expectations. Statistically, over the 16 week period, participants visited the discussion list between 26 times (for Student K, a PNG-based student who commenced later than the others and had more problematic Internet access) and 661 times (for Student C), as indicated in Figure 1.

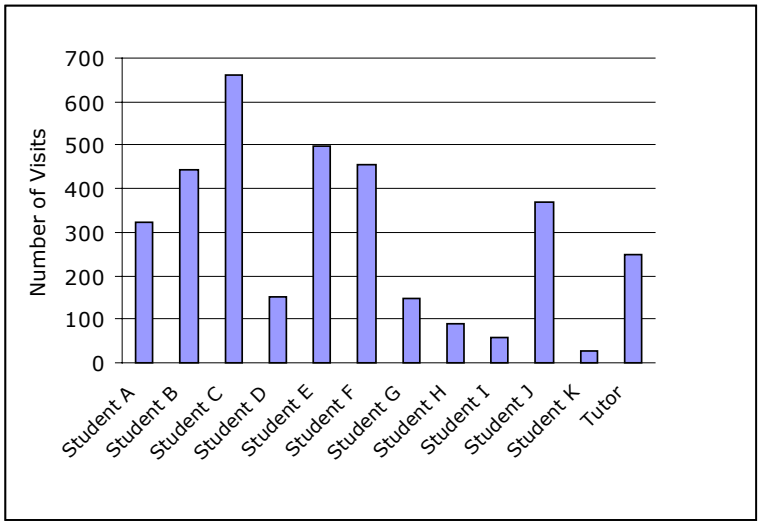

Figure 1: Number of 'hits' by each participant on the online discussion list.

Such quantitative data, derived from 'number of hits', does not in itself indicate depth or quality or engagement. Various issues might account for the differential data, including potential 'drop out rates' necessitating reconnection. However the data does support the claim that the discussion was 'student' driven rather than 'teacher' driven. Again this was an indication of the success of the constructivist approach.

As was required for assessment, all participants conducted a school analysis and developed a school IT plan. For the majority, particularly those in principal or deputy principal positions, these plans represented authentic school planning processes. The classroom teachers developed documents to evaluate and guide either their own classroom management processes, or to contribute to the wider school development context. For one of the teachers, the opportunity arose to

become a member of a cross-school ICT advisory group, an opportunity which she embraced and which added fresh impetus and relevance to her study in the Unit.

Perhaps the most notable influence that the Unit had on the participants was in terms of an increased level of enthusiasm for technology-based learning, and as one participant noted, ‘enthusiasm builds enthusiasm’.

WHAT WERE THE SUCCESS FACTORS?

In stepping back from the experience of offering the Unit to this first cohort some key success factors can be identified.

- A strong **sense of community** developed between all participants. While some of the group members had known each other before hand, those who were new to the group were readily welcomed and became an integral part of the learning set.
- The **timeliness** of undertaking the Unit was highly beneficial for many participants. The Catholic Education cohort, for instance, co-incidently received an ICT seeding grant to their schools during their involvement in the Unit. ISY00552 thus provided a supporting framework for them to plan the utilisation of this funding and enabled them to focus productively on IT in their school with tangible outcomes.
- The cohort of eleven represented something close to an **optimum group size**. Problems were encountered with the subsequent and much smaller cohort. If the group had been *too* much larger the volume of discussion may have become problematic.
- Students appreciated the **flexibility** of the Unit and their ability to shape their study around their professional and personal commitments and responsibilities. This applied in terms of content, and the flexible approach to timeframes.
- Participants could interact with each other in their **own time and place** due to predominant use of asynchronous communication. As busy professionals, negotiating a time for synchronous communication proved more difficult with only half the group being about to participate at the negotiated time. While this was an enjoyable and beneficial addition, asynchronous communication remained a preferred approach.
- A comforting **balance of formal and informal conversation** evolved. Collegial discussion ranged from deep levels of reflective engagement, formal contributions drawing on literature and readings to humorous anecdotes and interpersonal playfulness. This helped to create a relaxed and non-threatening environment.
- Participants enjoyed the **professional interaction**, the ability to network and find out what was happening in each other's school.
- The **diversity** of the group added to the richness of the discussion. The principals valued the input of classroom teachers who kept a strong focus on students and grass-roots practicalities. The principals provided the classroom teachers with a greater understanding of the complexities and idiosyncrasies of the whole-school management process. Similarly, the cross-fertilisation between primary and secondary sectors provided fresh insights and opportunities for greater collaboration and coordination of management approaches.
- Everyone gained from **cross-cultural contact.** The involvement of the two Papua New Guinea teachers facilitated a richness of learning and an ability for all participants to compare and contrast their school contexts**.**
- The online nature of the Unit provided me with the ability to provide **timely additional readings** based on participants' interests and needs. As discussion veered toward a previously unidentified issue I was able to locate resources to support our collaborative learning. Participants' were also able to **share school-based (or other) resources** such as policy documents, duty statements and hardware and software documentation.
- Participants appreciated the emphasis on **practical application.**
- In developing the Unit I predicted that some sensitivities may arise from discussion of specific school contexts. It was thus made clear to all participants that a level of **confidentiality and trust** was required and participants were encouraged not to contribute information which was sensitive, inappropriate or which identified particular individuals.

When asked what they saw as the key issues, insights or realisations they gained from the Unit participants mentioned such things as:

- the complexity of issues influencing IT and education;
- the importance of ICT integration and pedagogical consideration;

- greater awareness of financial constraints and issues;
- the variety of approaches to staff development, including the involvement of students;
- that school leaders must be supportive and willing to accept changes in both administration and curriculum implementation; and
- that everyone is in the same situation at the 'chalkface'.

WHAT WERE THE ISSUES?

A number of issues emerged during the delivery phase.

- While a number of the key readings had been provided to participants in hardcopy many were online. Some students expressed difficulties with reading on screen and expressed a preference for more readings in hardcopy.
- While the openness of the assignments was appreciated by students, in particular the ability to shape the tasks to their local contexts, there was an evident need for further clarification of expectations, particularly regarding depth of detail and level of use of theory.
- The 'Future Visioning' theme was left till late in the study period and did not receive the focus that it should have. Some participants commented that it may have been better to consider this theme early, if not first off, as it would have informed and underpinned many of the other management themes.
- The supplementary readings and the 'Online Library' didn't appear to be used as widely as I expected. Participants were busy professionals and this seemed to limit the breadth of their reading.
- Much of the discussion carried across management themes and thus the messages in each discussion 'thread' were not always 'on theme'. This did not cause a great deal of concern or difficulty as it was recognised by all that the themes were fluid. However the themes that were considered early on tended to be more fully and broadly explored than those focussed upon later.

Most of these issues are being addressed in the subsequent refinement of the Unit.

RE-EVALUATING THE CONSTRUCTIVIST APPROACH IN THE LIGHT OF EXPERIENCE

It is valuable to return to the constructivist notions which underpinned the Unit and to re-evaluate these in the light of experience. Escaping from a pre-defined body of content can certainly be seen to have been a positive step. The diversity of issues which were raised by participants (as illustrated in Table 1) indicate that participants had their own, valid learning agendas and that together we were able to direct learning to meet locally identified needs. The management themes seemed open enough to embrace the issues which participants were wanting to address, yet provided a sound framework to focus and loosely structure learning. Participants responded positively to the authentic learning context, focusing on their 'real life' work environment. Discussions grew from participants' past and present experiences and participants were open to challenging each other's assumptions and practices in a friendly and supportive environment. The online nature of the Unit allowed content and dialogue to be shaped by participants' experiences throughout the study period. As the participants encountered new ICT management challenges, so the discussion and learning could respond to their changing needs. The cohort generated infectious enthusiasm and a sense of learning 'enjoyment'. Participants were open to expressing their difficulties, perceived weaknesses and the challenges they faced in their own workplaces, and a level of genuine support emerged from this sharing.

Finally, to my role as an educator. Although I have always seen myself 'theoretically' as a constructivist and had implemented elements of constructivist learning and teaching into other Units, this Unit represented a significant adventure and challenge. My goal of explicitly grounding the Unit in constructivism, and helping participants to understand how constructivist learning might manifest in a technology mediated environment prompted me to re-address many of my assumptions, beliefs and established practices. The experience was a very positive and rewarding one, and I have certainly learnt a great deal, alongside the participant group, both about technology management issues *and* about constructivist learning.

CONCLUDING REMARKS

As a first offering of the Unit the experience certainly seemed a positive one for all participants (the 'students' as well as myself as tutor). It is perhaps most valuable to conclude this paper with some comments from the participants in this first cohort as, consistent with constructivism, what is most important in learning process is the knowledge which these individuals constructed for themselves.

> 'For the first time many leaders of schools are the ones who have the least amount of knowledge and expertise in a particular area (IT) so to make intelligent and productive progress he or she has to really share the decision making... there is no place for autocratic decision making'.
>
> 'Schools are for kids and if good teachers see technology as helping kids learn and open up fascinating opportunities then change will be embraced... Too many schools have foisted technological change onto reluctant teachers without preparing them properly and supporting when things get difficult. If teachers see good, sound pedagogical reasons for change and the transition is handled with sensitivity then most will be for it'.
>
> 'If educational change, including technological change in schools, is not motivated by a desire to improve learning opportunities for children then people won't go with it. If it is to showcase the school or to spend a grant or is politically motivated or to boost the ego of the boss, people won't be in it. Must be for kids!'
>
> 'If we want to create a preferred vision we need to not only consciously define those directional principles... but make sure the current decisions hold the possibility of that future being created'.

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