

Influence of teacher beliefs on web-enhanced learning experiences: Learners and teachers

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Research into teacher beliefs and practices in a web-enhanced environment have often failed to consider the influence of participant belief systems about web technologies in learning and teaching contexts in conjunction with these beliefs more generally. The findings from this study emerged as part of a larger PhD investigation into university teacher beliefs about web technologies, learning and teaching, and the enactment of these two belief systems in practice. For this paper, the influence of the belief systems of three award-winning university teachers on practice is explored in relation to learners and teachers and the design of web-enhanced learning experiences.

Keywords: academic teacher beliefs, web technologies, e-teaching, web-enhanced, learning experience, learning design, academic development

Introduction

Research into the beliefs of teachers using web or computer technologies has usefully examined teacher beliefs about web-enhanced learning (e.g. Keppell, Cote, Leung, Jones, & Richards, 2004) and the relationship between teacher's beliefs about learning and teaching and their technology-enhanced practice (e.g. Bain & McNaught, 2006; Goodyear, 2002; Reeves & Reeves, 1997). However, few studies have sought to understand the influence of academic teacher beliefs about web technologies themselves in a learning and teaching context (Ertmer, 2005). This paper, based on findings that emerged from a PhD study (in progress), focuses on the role and relationships of learners and teachers in the stories of three academics who were recipients of The University of Queensland (UQ) Excellence in Teaching Awards and who had incorporated web technologies into their teaching practice. Using a combination of concept-mapping and stimulated recall tasks and interviews, these roles and relationships were explored in terms of the influences of participants' beliefs about learning and teaching, their beliefs about web technologies (in a learning and teaching context) and the design of web-enhanced learning experiences

The study context

Increasingly, academic teachers are using web technologies to add value to or replace other forms of university teaching. Their web sites are tangible and dynamic constructions that represent the teacher's thinking and decisions derived from implicit belief systems about teaching, learning and the use of web technologies (Steel, 2003). The integration of web and other new and emerging technologies into university teaching practices holds both opportunities and risks for the quality of university education. For this reason it is imperative that a better understanding is gained of the influence of teacher's beliefs about web technologies and those about learning and teaching.

Research context

The use of web technologies in higher education is increasing in most universities and is an important area of focus in academic staff development. Many researchers in this field agree that if academic staff developers are seeking to assist teachers to improve their practice they need to find ways to make explicit and influence teacher beliefs (Ho, 2000; Kane, Sandretto, & Heath, 2002; Kember, 1997; McAlpine & Weston, 2002). School-based studies into beliefs of exemplary technology-using classroom teachers have been revealing and have had implications for teacher development programs (Ertmer, Gopalakrishnan, & Ross, 2001). For example Ertmer et al. (2001) found that 'no one vision of teaching and learning motivates teachers to strive for exemplary use' and that their visions encompassed 'multiple emphases' dependant on their perceptions of the needs of their students and their jobs as teachers. The authors stressed that while teachers required good access and support for technology use, this was unlikely to

engender exemplary practice. They proposed that teacher development designed for teacher growth, access to expert examples, visions and strategies would be more useful.

In both school and university education, the study of the beliefs and/ or practices of effective, experienced, award-winning or expert teachers has proven to be illuminating (e.g. Ballantyne, Bain, & Packer, 1997; Dunkin, 1995; Dunkin, 2002; Kane, Sandretto, & Heath, 2004). Exemplar academic stories such as those documented in the substantial work of Ballantyne et al. (1997) made the thinking, beliefs and decision-making of effective teachers more accessible in order to 'promote academic reflection and discourse on the quality of teaching in higher education' (p. xiii). Much can be learnt from exploring the implicit professional thinking and beliefs of experts. Research conducted by Dunkin (2002, p.55) found that, like many school-based studies, expert teachers possessed a complex and rich repertoire of thinking about effective teaching. In reflecting on one's own teaching, much could be learnt from making ones own beliefs and practices explicit and perhaps drawing on insights from case studies on the beliefs and practices of exemplar teachers.

Bates and Poole (2003) proposed that 'the choice and use of technology are absolutely dependent on beliefs and assumptions we have about the nature of knowledge, how our subject discipline should be taught, and how students learn' (p.25). This study attempts to make explicit the beliefs and practices of three award-winning university teachers from three different disciplines in relation to learners, learning, teachers and teaching. Exploring the beliefs and practice of these expert teachers provided rich data that illustrated a variety of approaches to thinking in different disciplinary contexts.

Methodological approach

The selection of a case study methodology is appropriate for a study that is largely seeking to understand 'how' certain contemporary events occur (relationships between belief systems and their enactment in practice) and 'what' in an exploratory sense (implications for practice and for academic staff developers). Yin (1994, pp. 5-9) suggests that when these 'how' and 'what' conditions are present, a case study design is appropriate. He also grants that a researcher can use more than one strategy within a case study and these strategies do not need to be mutually exclusive (1994, p.9).

Participants

The candidates for the three case studies discussed in this paper were all Excellence in Teaching Award-winners at UQ and were part of a larger sample in the PhD study. All participants were selected purposively from two population pools that are representative of similar academics and faculties across UQ. Purposive or judgment sampling, a common type of sampling in qualitative research, involves the researcher using their experience and prior knowledge of groups to select participants according to clear criteria (Gay & Airasian, 2000, p.138). For the larger study it was essential that all participants were academic teachers who were using web technologies in their teaching and possessed a belief system about web technologies themselves. In all cases the academics were using a commercial Learning Management System (Blackboard) to create web-enhanced learning experiences via their course website.

The teachers discussed in this paper represent both Science-based and Arts-Humanities based disciplines. At UQ, teaching award winners undergo a rigorous application process that includes initial nomination by at least five people who are academics or students (at least one of each). The reader should take into consideration that the application process itself can influence how academics articulate their teaching practice. The participants represented in this paper had a range of teaching experience from between five to more than ten years and all held at least one education related degree. One had been using the web in their teaching for 3 to 4 years and the remaining two had used it for 5 to 10 years. In terms of their experience in designing an online component for their courses, one had designed 2 or 3 sites, one had designed 4 or 5 and one had designed more than 6. The three participants were between 36 and 55 years of age.

Data collection

The main sources of data collection were stimulated recall, concept mapping and associated interviews. Additionally, a short questionnaire was completed by participants to extract primarily quantitative

background and demographic data. A pilot study was conducted in 2002 to investigate the effectiveness of concept mapping and stimulated recall to reveal academic teacher beliefs and how they are enacted through learning designs for the web (Steel, 2003). That study concluded that the use of concept mapping and stimulated recall as data elicitation techniques were useful in this type of investigation. Both techniques were used in a similar way for this study. Participants completed an interview using their course website as the artefact that was their stimulus for recall. They then constructed two consecutive concept maps each followed by interviews (i.e. concept map 1 then interview, concept map 2 then interview).

Stimulated recall activity

Stimulated recall is a method that attempts to access a person's meta-cognitive knowledge in response to a stimulus (Keith, 1988). Cues that are inherent in the artefact, in this case a course website, stimulate the participant to access and verbalise an account of their beliefs, thought processes and ideas in relation to the stimulus (Calderhead, 1981, p.212). As the participant would not actually be designing or implementing their site during the interview, the teacher would be recalling decision-making and student responses retrospectively. In this study, and in the pilot study, the limitation that *retrospective* verbal reports may not be entirely accurate must be acknowledged. One must also take into account that there is always some slippage between what one recalls and actuality, and that most tasks of this nature involve a level of complexity that it is nearly impossible to express using language.

A semi-structured interview with guiding questions prompted each participant to explain the design of the learning experiences available via their website and how these were intended for student learning. Each site had been implemented at least once with learners and most recently in the semester prior to data collection. The data was collected using a cassette recorder and an on-screen capture software Camtasia™ that recorded the voice in synch with screen capture and mouse movement culminating in the creation of a video file. All participants provided the researcher with their course outlines and ongoing access to an archived version of the course website. Access to these two resources meant that clarity could be sought during data analysis as required.

Concept mapping tasks and interviews

Concept mapping is said to assist in making declarative knowledge, including the relationship between concepts, visible. The concept mapping method has been used extensively in science education research and more recently in studies of expert and novice knowledge domains (Olson & Biolsi, 1991, p.240). It also offers researchers a way of documenting and exploring participant propositions in relation to their belief systems. Concept maps have drawn criticism regarding reliability and validity issues, however, Novak (1998) advocates that these issues are addressed in the natural transparency of concept maps. Validity, he says, can be appraised through the propositional relationships and the hierarchical structures of the map itself (Novak, 1998, p.192).

Each participant constructed a paper-based map about their beliefs about web technologies in a learning and teaching context first, and after an interview on that map, proceeded to a second paper-based concept map on their beliefs about learning and teaching. This was again followed by an interview. Pre-printed sticky labels were provided for each concept map along with blank labels for the creation of participant's own concepts. The participants were told that they were under no obligation to use any of the pre-printed labels except for the overarching concept (i.e. Web technologies & learning and teaching). They were also able to change the wording on any of the labels if they so desired. The use of the pre-printed labels (see Table 1) served several purposes including guidance and scaffolding for the activity which provoked participants to think about their beliefs in relation to some broad ideas around the overarching concepts. This strategy also assisted with cross-case analysis. The use of the words 'can' and 'cannot' (with propositional arrows) and 'effective', 'ineffective' and 'role' was to incite participants to express their beliefs in terms of both positive and negative propositions so that a fuller picture of their belief system would emerge. Most participants used the majority of the labels in addition to their own self-created concepts. The original concept maps were later converted to electronic format by the researcher using a concept mapping software called IHMC CmapTools™. The researcher believed that having the participants construct the maps in a paper-based form was less cognitively demanding and meant that they could concentrate on the task at hand (representing their beliefs and mapping relationships visually).

Table 1: Pre-printed concepts

| Overarching concept | <i>Web technologies</i> (Concept map 1) | <i>Learning and teaching</i> (Concept map 2) |
|--------------------------|--|---|
| Optional concepts | Can → | Effective learning |
| | Cannot → | Ineffective learning |
| | Role of web technology | Effective teaching |
| | Effective web technologies | Ineffective teaching |
| | Ineffective web technologies | Creates knowledge |
| | Effective (web) teaching | Creates learning experience |
| | Ineffective (web) teaching | Role of learners |
| | Effective (web) learning | Role of teachers |
| | Ineffective (web) learning | Role of content |
| | | Role of assessment |
| | Role of feedback | |

A semi-structured interview was conducted to access a narrative account of each concept map. A set of guiding questions were developed prior to the interview but ad hoc questions were used during interview to follow certain lines of inquiry. A semi-structured approach allowed some flexibility in the mutual construction of the account while assuring that core issues were canvassed.

Data analysis

Analysis for this type of research typically consists of using an inductive grounded approach (Glaser & Strauss, 1967) where categories of beliefs emerge from the data (Kember, 1997, pp. 258-259). Transcripts of stimulated recall interviews were analysed in tandem with viewing the Camtasia™ video files, the archived website and course profiles as required. This assisted in re-examining evidence of participant claims in practice. The transcripts of the concept map interviews were analysed while viewing the concept maps (in both original and electronic formats) to assist in the exploration of propositional relationships and inter-relationships between concepts. All transcripts were read and re-read consistently throughout the different stages of data reduction as recommended by Miles and Huberman (1994, pp. 10-12). Data analysis was further facilitated by the use of QSR N6™ to manage data and locate patterns and themes.

Findings

The three participants in this paper are known by the pseudonyms Kara, Jack and Tulula. This section presents some of the findings about their beliefs about learning and teaching, about web technologies in relation to learners and teachers, and how these were enacted in their web-enhanced learning designs. Initially their beliefs and practices are presented followed by a discussion of common and diverse themes that emerged from the data.

Beliefs: Learning and teaching

Kara on learning and teaching

Kara envisaged the relationship between teachers and learners to be likened to a craftsman and apprentice. As an apprentice, students needed to *want* to learn from someone whom they presumed has the disciplinary knowledge and expertise. She was concerned about recent debate around client-service provider models in universities as she believed that as a client, the learner may 'expect things that may not actually deliver any sort of learning to them'. The role of the learner though, was 'extremely important' in the enactment of learning as teaching and combined with the quality of teaching, it determined 'whether knowledge actually gets created'. Core to Kara's beliefs were the critical roles of communication, socialisation, scaffolding and disciplinary content in student learning.

Jack on learning and teaching

For Jack, the whole aim of learning and teaching was to get students so motivated, enthused and interested that they thirsted for yet more knowledge. He saw the relationship between learners and teachers as having an equitable participatory role in the creation of the learning experience however the teacher was responsible for trying to ensure it was positive and that students were stimulated and engaged. Learners, he believed, need to be given the opportunity to explore, discover and engage in disciplinary content and research so that knowledge formation became process orientated rather than broken into disaggregated recitable facts. Jack also acknowledged that because there is so much variability amongst students, a learning experience that might be powerful for most students, will not necessarily be effective for all learners. He believed that teachers need to monitor learner responses to 'reinforce or re-evaluate our overall teaching philosophy'.

Tulula on learning and teaching

Behavioural change in students in relation to their professional context and conduct was a core aim of learning and teaching for Tulula. She believed that learners and teachers, as collaborative partners, co-created the learning experience. However, the locus of control for learning was firmly in the hands of the learners. Learners, she believed, can build knowledge in a number of ways. For example, they can create knowledge socially with their community or solely through working towards an assessment piece. They use their prior knowledge, teacher feedback and hopefully learn how to evaluate and monitor their own learning to help them create their knowledge. Tulula conveyed that a learner's self-schema, social context, self-concept and motivation also impacted on student learning, and in view of these, it was the teacher's role to select content cognizant of learner needs and interests, and to create assessment and select pedagogy congruent with the nature of the content and assessment. She also believed that 'it would be foolish to imagine (you would have) an environment where only effective teaching occurred'. Teachers 'cannot control the space, you can't control (learner) social interactions... their motivations or where their heads are at on a particular day'.

Beliefs: Web technologies

Kara on web technologies

Web technologies, Kara believed, were tools that needed to be combined with a teacher's educational knowledge in order to be of value in a learning and teaching context. Technology-driven or 'build and they will come' approaches were not acceptable to Kara. A good web-based learning environment, Kara believed, needed to be learner-centred and educationally driven.

My beliefs are that as a teacher you need to be pedagogically aware and obviously have good discipline knowledge. You need to be aware that technologies by themselves are not going to do the job for you. You, as a teacher, have to take the tool and combine that with your innate educational capabilities to create a learning environment.

Kara strongly believed that both teachers and students needed to be engaged with the online course community. She was particularly committed to providing an equivalent learning experience for her on and off-campus learners and thinking about how students learn using the web and how to design for learner inclusiveness and engagement. She believed in creating a flexible, student-centred design with strong opportunities for interaction, communication and socialisation amongst students and with the teacher. Such learning designs, she believed, provide opportunities for students to feel more engaged and motivated and to receive just-in-time feedback and scaffolding. Reflection was an important issue 'for the lecturer and also for the students'. Getting students to 'reflect on what they have learned and the types of technologies they have used' gets them to start to understand 'how they're learning themselves, what they've learned from' and how they have engaged with the disciplinary knowledge.

Jack on web technologies

During the construction of his concept map, Jack 'wrestled with the idea' of placing the concept of 'web technologies' at the top of his map. He resolved that it was the teacher's principles of learning and teaching that should drive the use of web technologies to support the objectives of learning and so they were placed above web technologies. Of particular concern to Jack was that the focus of the online learning designs should be on the learner and learning, not on the teacher or the technology. The teacher

is there to provide guidance and design active learning tasks that assist students to gain disciplinary knowledge and deep understanding.

One of the things you worry about with technology, I guess, is (learners) just clicking, randomly clicking. And I want to put in here ‘bells and whistles’ - you know that very fancy kind of software with all the bells and whistles? It all becomes the focus rather than the learning itself.

For Jack, a major affordance of web technologies was the way they could enrich face-to-face learning. He believed it offered him opportunities to engage students in different ways than he can in his large on-campus classes. A well designed course website could be used to stimulate deep and active learning thus helping reinforce and illustrate content and theory. The web also provides a safe learning space to move learners out of their comfort zone a little. Using online communication, learners can ask questions, Jack can probe their knowledge, and students can provide ‘informed responses without the glare of the other 149 students if they get it wrong’.

Tulula on web technologies

Tulula believes that, in an educational context, web technologies are a tool that may be employed to support the aims of learning and teaching. In particular their use enables alternative types of communication and connectivity that can create a socially and culturally inclusive learning environment that value-adds to other learning experiences. Tulula stressed the necessity for high quality educational design so the whole package is designed coherently. Learners may ‘feel confused and panicked by the web technologies’, and if the site is overly complex or busy ‘they might feel directionless and powerless with their own learning’.

Students should feel comfortable and motivated by the technology, by the environment, by how the package fits together, and that’s one of the key challenges of using technology because so much is available to you, you can make something overly complicated.

The ability for the learner to understand linkages within the whole learning package, and apply them to the authentic experience, are key points that embody Tulula’s thinking about effective web learning. She believes that learners should be able to articulate their learning, what it is that they have learnt and what it means to them and their profession. The web provides opportunities to connect learners to diverse resources and sources of expertise. When the web learning environment is designed for social interaction there are opportunities for learners to predict and test their ideas with others and to hear themselves articulate the knowledge they are creating.

Practice

Kara’s website

The course website that Kara chose to use for the stimulated recall interview was designed for an undergraduate (3rd year and above) course with approximately 50 students. In practice, Kara’s website was a hub of activity and a strong socialisation mechanism for learners and for herself. She provided a thorough orientation to students about how she expected them to engage with the site at the commencement of semester. Initially, she felt students expected that they would not need to think about the course again until they turned up at the lecture again or were completing an assignment. However her design meant learners needed to be more committed and involved with the course. She said that learners ‘end up having to change (this thinking) radically’ as ‘they suddenly realise that they’re going to actually have to be involved in this course almost on a day-to-day basis’.

Kara’s site invites learners to critically analyse and participate in professional ideas, communities, tools and resources. Learners, as apprentices, are encouraged to engage, communicate, discuss and share knowledge through their interactions with her disciplinary knowledge and expertise that are available online in structured html modules. Kara designs real and virtual world ‘hooks’ (stimulus) and authentic assessment tasks such as group projects and focused online discussion topics based on disciplinary issues, concepts and research. Her design proposes to incorporate learner interests and stimulate their prior knowledge. Multiple scaffolding mechanisms are used and Kara clearly conveys her expectations about the desired quality of learner contributions. Her design offers both on and off-campus learners the

opportunity to cross-fertilise ideas and experiences and engage in the learning experience without any significant differentiation. Using her online communication mechanisms Kara acts as facilitator, coach and co-learner. For Kara this constant connectivity through the site helps to eliminate the internal-external student divide, to be inclusive of geographically dislocated students and to build a course culture and sense of community amongst learners and with herself.

It develops a course culture around students interacting with each other, and with me. I find the students seem to be almost friendlier with me. They are at much more ease with me as the lecturer, because I am part of this discussion all the time.

Students must submit a non-assessable reflective document at the end of her course where they monitor how and what they have learned. The structured format and communication mechanisms are cited by her students as being highly influential to their learning.

Jack's website

The course website that Jack chose to use for the stimulated recall interview was a first year undergraduate course with approximately 230 students. Jack designed his website in consideration of his diverse learners who ranged greatly in their age groups, background, education and exposure to web technologies. He believed that students often bought into a myth perpetuated by 'the US movie image of having big lecture theatres' that university education was just a didactic lecturer to student experience. He wanted students to think about the course on a weekly basis rather than just when assessment was due. Concerned with 'breaking the myth as quickly as we can' he ensures that 'in tutorial in week one, the very first thing they do is to log on'. This includes an orientation of the site where 'we take them through the web site so they become familiar with the tools, how they are used and how they are accessed'. He hopes that 'we encourage the younger students who are computer literate and hopefully have no phobias or anxiety to use the computers so we can engage them'. For the mature-age students 'we are developing their skills and we show them that this particular website is not going to bite them in anyway'.

Communication was an important aspect of the website. Jack believed that 'a lot of things happen within this course that demand communication' and that the web technology 'seemed to be a very useful tool for that'. The website included 'all the learning activities for this course' and the students had to participate 'in various activities at various times' that were non-graded but 'required'. The almost weekly online activities provided an opportunity for students to engage with disciplinary research and apply theoretical concepts using quizzes, surveys, role plays, scenario analysis and simulation games. Jack held the belief that 'if learners can experience the theory I think that leads them to have a better understanding of it'. Students were given the opportunity to 'replicate the research' in this course and with the use of online tools data could be quickly aggregated and then presented in tutorials for further discussion.

Jack felt that the lecture and tutorial model without any other contact reinforces the compartmentalisation of learning. He emphasised that the greatest benefit of having this ongoing connectivity through an online presence is that it 'seems to break down that barrier somewhat because now students know that they can find information about my course, communicate either synchronously or asynchronously with their lecturer and other class members and engage in learning materials at any particular time'.

Tulula's website

The course that Tulula chose for her stimulated recall interview was an undergraduate (3rd year and above) course with between 100 and 150 students in their final semester of study. The website component of Tulula's course was developed as a deliberate blended learning strategy to entice students to participate more fully in the course. Tulula was aware that students in their final year of this undergraduate program were reluctant to come on campus to lectures as they had just returned from some practical vocational experience. It was important to find ways for students to cover the core issues raised in the course whether they were on-campus or not. However Tulula felt that she didn't 'want learners to feel as though they could throw away and burn their books and the other materials'. The course included a textbook, a printed learning guide, offline activities, some lectures (not many), optional face-to-face workshops and a compulsory two day face-to-face conference where all students had to articulate their own research and learning. An initial face-to-face course orientation combined with a framework offered on the course website showed learners how the whole course fitted together.

The website provided online tutorial support, diverse authentic resources and interactive tools and assessable online activities such as professional group panel discussions. With most students having already gained full-time employment and some even working in their profession, students were developing self-concept and self-schema in relation to their professional selves. Drawing on these and weaving them into learning were important in Tulula's website and assessment design. In their real professional world, Tulula considered that students could easily become isolated as early career professionals. It was important to Tulula to equip these students with tools, strategies, networks and a sense for how their university learning has a place in their day-to-day professional lives.

The idea being to get them to think about the literature and the theory critically in terms of what they know about (the professional working environment) so that they'd get this idea, at the very point at which they're going off into the wide world as professionals, that the university information, knowledge, and resources actually has a place in getting them through their day to day lives in (their working environment).

Students had many choices about how they participated in the course and the professional issues they investigated. Using the inherent non-linear nature of the web allowed Tulula offered students a range of approximately 132 'adventure' options and various 'triggers' so that learners had 'choices, both in perception and in reality'. It also meant that 'the way that (students) learn is going to be matched one way or another, to their preferred learning style' and their sense of professional self.

Discussion

For each of the three award-winning teachers the relationship and collaborative effort of learners and teachers was essential to achieving the aims of learning and teaching. It was clear from their learning and teaching beliefs that, even with different roles, both the learner and teacher had responsibilities that influenced the outcomes of learning and teaching. For Kara as master craftsman the learner needs to be committed to learning as an apprentice from the teacher as disciplinary expert. For Jack learners and teachers had an equal participatory role and while the teacher was responsible for designing learning to enthuse learners and providing a stimulating and engaging learning experience, learners needed to partake in these opportunities as deep and active learners. For Tulula, the teacher as a collaborative partner in the co-creation of the learning experience, considered learner needs and interests in the selection of content, assessment and pedagogy, but ultimately the locus of control was with the learner. Tulula recognised the extent to which the self-schema, self concept, motivation, social interactions and the way they engaged in learning influenced the experience and achievements of learners.

All three teachers expressed the belief that web technologies were a tool for teachers to combine with their own knowledge or philosophy of learning and teaching to design for learning. They expressed the view that the use of web technologies needed to be driven by educational aims with consideration of their diverse range of learners rather than a 'build-and-they-will-come' approach. Kara stressed the need for both learners and teachers to be engaged in online learning and the opportunities afforded by web technologies for interaction, inclusiveness, socialisation and communication. Jack believed that web technologies could further enhance his lectures and tutorials by extending student engagement and stimulating better communication and deep and active learning in a safe virtual zone. Tulula also spoke of the opportunities around social interaction and communication when using web technologies and the culturally inclusive environment they can help create. She stressed the importance of good educational design so that students feel comfortable and motivated by the web environment and can see how the whole package fits together. Connectivity between learners, diverse resources and the teacher, was a clear benefit for Tulula and alluded to by both Kara and Jack.

In practice all three teachers made the educational aims for using the website explicit to their learners. Each provided a thorough learner orientation to the course website that included a rationale explaining why they had used the technology, and an explanation of how the technology was to be used on a regular basis with clear expectations of learner use. Each website showed evidence of clear guidance and scaffolding within activities and in relation to the whole course. Communication, socialisation and discussion-based tasks were a strong feature of all these learning designs. For Kara and Jack, their website designs engendered daily or weekly student participation and connectivity with their courses and learner communities. Web technologies also assisted Kara to provide a more equitable learning

experience for her off-campus learners. In Tulula's case, the web provided her learners with options around how they participated whether they were on-campus or not. Learner interests, needs and motivation were considered in all three web designs. Kara's 'hooks' and authentic assessment tasks and Tulula's 'triggers', 'adventure options' and professional links stimulated learner engagement and interaction. Jack's weekly online activities motivated learners to experience disciplinary research and concepts that could be further explored in tutorials.

While these common themes emerged during data analysis it was also notable how some of the different participant beliefs influenced their design approaches. Kara conveyed that her view of learners and teachers was quite structured and formalised through the teacher-craftsman as expert – learner as apprentice model. Her beliefs about web technologies were focused on the attributes *the teacher* as the craftsman needed and how *the teacher* might design and provide guidance for learners. In practice Kara's site was designed so that expert knowledge was available in a structured format and her craftsman-like approach had a strong guiding presence in the social interactions with learners on the site. In contrast, Tulula put more emphasis on the learner, learner responsibilities and learner choices. She believed in learners and teachers as collaborative partners but expressed a firm belief that learners are ultimately responsible for their own learning and the creation of their knowledge. In expressing her beliefs about web technology, she stressed the need for appropriate educational design from the point of view of the learners (so that they don't feel directionless and powerless) and in terms of what comprises effective web learning. In practice, her site was very learner centred and offered learners many options and choices about how and what they learned with an emphasis on enabling the learner to transition to professional life. Jack's learning and teaching beliefs were centred around the teacher motivating and enthusing students to light their fire for learning. He also focused on equitable learner and teacher participation in active and deep process orientated learning. His web beliefs expressed his commitment to learners and learning over teachers or the technology itself and he believed that technology offered him different ways of stimulating learners to participate in deep and active learning. In practice he used his website to connect his learners more strongly and more frequently to their learning experience and to engage them more deeply with disciplinary research and concepts. In this way, the web technologies offered him an alternate and complementary way to enhance his face-to-face classes.

Conclusion and implications

There is yet much to learn about the influences of teachers' belief systems on their use of the web and other new and emerging learning technologies. As suggested in the pilot study (Steel, 2003), the data collection techniques of concept-mapping and stimulated recall were successful in eliciting rich and revealing data about the beliefs and practice of academics using the internet in their teaching practice.

Exploring the beliefs and practice of award-winning teachers with a relatively intricate and bountiful range of thinking about learning, teaching and web technologies revealed a variety of themes, beliefs and practices, a few of which are reported here. This paper demonstrates how differing belief propositions around learners and teachers, influenced the participants' approaches to designing and implementing their course websites. While some of these beliefs may be equally applicable to non-web-based learning environments, in all cases the web technologies afforded the enactment of these beliefs through the various tools they offered.

Specifically this study starts to shed some light on why it is necessary to also consider teacher beliefs about web technologies if we are to explore teacher practice in a web-based environment. In subsequent papers, I intend to further explore the claim made by Bates and Poole (2003, p.25), about the inter-relationship between our choice and use of technology and our beliefs about knowledge, teaching in our disciplinary context and the way students learn. It is hoped that this and further papers from this study will be usefully employed to inform academic development and practices around the use of web technologies in university learning and teaching.

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