

Approaches to Teaching and Technology Use among International Award Winning University Teachers

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Abstract: There is wide-spread acknowledgement of the benefits of well thought out online learning opportunities that provide students with active learning environments that extend the classroom space. This paper reports on the approaches to teaching in general, and in particular approaches to the use of technology, by award winning university faculty in Canada, Australia and Hong Kong. Findings indicate that the majority of these award winning teachers adopted an approach to teaching that was student centered and focused on changing the students' conceptions of the material being studied, rather than an approach that was information focused. While technology as a tool to provide information resources was a part of their repertoire, their use of technology extended beyond content delivery to provide activities and resources for active learning. Examples of how they incorporated technology for active learning will be provided.

Keywords: technology use, award winning teachers, active learning, international perspectives

Introduction

It seems that the use of technology is here to stay and discourse on the value of online learning continues to be an active topic of conversation in higher education (Cicco, 2009). Well thought out online learning opportunities can provide students with ways to engage with the course concepts and resources both in and out of class, leading to enhanced learning and in-class engagement (Salter et al., 2009). However, there is widespread variation in the use of technology across disciplines and institutions and faculty consistently identify key challenges in the use of technology in teaching practice (Laurillard, 1993; West, 1999; Salter et al., 2004; Brill & Galloway, 2007; Salter et al., 2009).

Many studies have explored how teachers' practice is influenced by their beliefs about teaching. One of the earliest studies about the beliefs of award winning teachers was conducted by Dunkin & Precians (1992) in a study at the University of Sydney. In this study, award winning teachers were interviewed to tap into their conceptual repertoires regarding teaching effectiveness and evaluation of teaching. Other studies, related to examining good teaching practice, have explored issues such as teachers' experiences of academic leadership and their approaches to teaching (Ramsden et al., 2007) and academics' conceptions of science learning and teaching (Prosser et al., 1994). A review of 13 articles about the conceptions of teaching of university academics argued that conceptions of teaching and teaching approaches are strongly influenced by the teacher's underlying beliefs and that these beliefs must be taken into account if measures to enhance the quality of teaching are to be effective (Kember, 1998). Award winning teachers beliefs about teaching and their strategies for teaching were investigated further through eighteen interviews with award winning teachers at the Chinese University of Hong Kong that explored beliefs about excellent teaching as well as the rationales given by award winning teachers for their choice of instructional strategies (Kember et al., 2006). The current study goes beyond the previous work to explore cross-disciplinary and international differences in approaches to teaching in general as well as to investigate approaches to the use of technology.

Approaches to Teaching

In previous studies of approaches to teaching, two qualitatively different approaches have been identified that may be categorized as being either 'student focused' (focused on changing students conceptions of the

material being studied or ‘teacher-focused’ (focused on the content of the material to be learned and subsequent transmission of information) (Trigwell et al., 1994). Adoption of a more student-focused approach to teaching has been linked to the improvement of students’ learning outcomes (Hanbury et al., 2008). The student-centred approach has been described as one that fosters meaningful learning rather than learning for replication of information. However, some disciplines may lend themselves to more of a ‘transmission of information/content focused’ approach and yet still result in students’ success in attaining learning outcomes and perceiving the teacher as an ‘excellent teacher’.

With the introduction of technology in the form of course management systems and in-class data projectors, the early use of technology tended to be limited to an information transmission approach such as putting content online within a course management system (such as webCT, Blackboard, Moodle and others), and/or using a course web site to post lecture notes and course related content, and/or using power point slides in class as a way to organize content into bullet points of information. This trend to use technology for the delivery of content based information may have been exacerbated by the common practice within institutions of separating staff development in pedagogy (ran by the academic development centres) from the ‘technology how-to’ programs to teach faculty how to use a course management system conducted by the technology centres.

The purpose of the current research study was to explore the approaches to teaching and the use of technology by faculty in Canada, Australia and Hong Kong who had been awarded local, regional, or national teaching awards while teaching at research intensive universities and also to explore recommendations for staff development through ‘lessons learned’ from award winning teachers at research intensive universities. This paper reports on these aspects of a larger project that explored award winning teachers views on teaching, their personal narratives on how they became an award winning teacher, their views on recognition and reward of exemplary teaching in research intensive universities and their suggestions for academic staff development programs.

The specific research questions addressed in the current paper are:

1. How do award winning teachers approach teaching in terms of the approaches identified by Trigwell and Prosser as either Information Transmission/Teacher Focused (ITTF) or a Conceptual Change/Student Focused (CCSF)?
2. How do award winning teachers use technology?
3. What motivated them to use technology to enhance learning and teaching?
4. How might institutions support faculty professional development, including the use of technology to enhance learning and teaching?

Research and Methodology

The sample was made up of award winning teachers from international research intensive universities in Hong Kong, Canada and Australia. The teachers were identified through a pool of teachers who had won university teaching fellowships during the past 5 year period (2005-2009). A five year window was chosen to provide cross disciplinary representation with a goal of including teachers from each of the following four disciplinary areas: Humanities and Social Sciences (H&SS), Science and Technology (S&T), Business and Law (B&L) and Health Sciences (HS), across three countries, Hong Kong (HK), Canada (CAN), and Australia (AUS) so that a sample of 36 teachers was included. Since it was expected that award distribution may be unequal across disciplines, it was believed that a 5 year window would allow subjects to be identified across disciplines to participate as subjects in this study. The distribution of the 36 final participants by country and discipline is shown in Tab. 1.

Country	Discipline Areas: Humanities and Social Sciences (H&SS), Science and Technology (S&T), Business and Law (B&L), Health Sciences (HS)				Total
	H&SS	S&T	B&L	HS	
Australia	3	5	4	3	15
Canada	3	3	3	3	12
Hong Kong	2	2	3	2	9
Total	8	10	10	8	36

Table 1: Number of Participants by Country and Discipline Area

The data collection included two components: 1. the administration of an online survey that included the Approaches to Teaching Inventory (ATI) and the Use of Technology Inventory (TI) and 2. the administration of a semi-structured interview protocol. The ATI was developed and used by Prosser & Trigwell (1999) to investigate teacher approaches to teaching. The scales of the ATI are: Information Transmission/Teacher Focused (ITTF) and

Conceptual Change/Student Focused (CCSF) (Trigwell & Prosser, 1991; Prosser & Trigwell, 1999; Trigwell et al., 1999). The technology inventory (TI) was developed for this study and piloted internally. The technology inventory included 60 questions to explore teachers' beliefs about how using technology impacted student learning and the type of technology supported activities they used as well as their motivation for using technology and the type of staff development they received or recommended. The inventories were administered electronically prior to the face to face interviews. The data from the inventories was analyzed to identify how the award winning teachers tended to approach teaching within the categories of information transmission and conceptual change and their approaches to, and use of, technology.

The semi-structured interview protocol was developed for this study to further explore (through a qualitative approach) the conceptions and beliefs of the award winning teachers about teaching excellence as well as to further probe their personal narratives about their journey to becoming an award winning teacher. The qualitative interview allowed award winning teachers to expand upon their beliefs and to give their views regarding approaches to staff development programs that might help teachers become better practitioners. Specific questions within the semi-structured interview asked the teachers about the role that technology plays in their subject, including the teaching, communication and feedback aspects of technology use. Following responses, additional probes explored their beliefs on the importance of technology, their strategies for using technology and factors that facilitated the use of technology at their institution.

Interviews were audio-taped and later transcribed. Following transcription, a qualitative analysis was performed to look for similarities and differences in approaches. The phenomenographic analysis (Bowden & Martin & Booth, 1997; Walsh, 2000) aimed at identifying broad variations in experiences. This approach allowed for a range of perspectives (in this case from the award winning teachers in different disciplines), relative to specific phenomenon (in this case learning, teaching, staff development and use of technology) to be examined. This type of qualitative, phenomenographic research allows an investigation into the qualitatively different ways in which people make sense out of their experience (Bowden, 1994). In a phenomenographic approach, the preferred method of data collection is the semi-structured interview (Marton & Booth, 1997). The aim of this type of qualitative research is to attempt to gain insight into an individual's subjective interpretive patterns, experiences and positions (Uelzhoffer & Ascheberg, 1999). The sample size of 36 is considered appropriate for a phenomenographic approach; Trigwell (2000) proposed that a sample of between 15 and 20 is sufficiently large to reveal most possible viewpoints and allow a defensible interpretation.

Results

Approaches to Teaching

In an analysis of the quantitative data collected in the inventories, it was found that most of the participants responded in a way that showed a Conceptual Change/Student Focused approach to teaching. The total scores were computed for the Approaches to Teaching Inventory (ATI) as recommended by Prosser & Trigwell (1999). The paired-sample t-test demonstrated that respondents were more likely to adopt a Conceptual Change/Student Focused approach (CCSF) rather than an Information Transmission/Teacher Focused Approach ($p < .001$) (Tab. 2). There were no significant differences between countries (Tab. 3), or by discipline area (Tab. 4). In other words, regardless of country or discipline, the tendency to take to adopt CCSF approach was the most prevalent.

	Overall Score	Paired-sample t-test
Information Transmission / Teacher Focused (ITTF)	34.42	t = -3.63, p<0.001
Conceptual Change / Student Focused (CCSF)	41.50	

Table 2: Approaches to Teaching Score – Overall

	Australia	Hong Kong	Canada
Information Transmission / Teacher Focused (ITTF)	35.60	36.78	31.17
Conceptual Change / Student Focused (CCSF)	40.67	45.67	39.42

Table 3: Approaches to Teaching Score by Country

	H&SS	S&T	B&L	HS
Information Transmission / Teacher Focused (ITTF)	32.88	36.20	32.90	35.63
Conceptual Change / Student Focused (CCSF)	44.38	36.40	42.80	43.38

Table 4: Approaches to Teaching Score by Discipline

The two scales of the Approaches to Teaching Inventory (ITTF and CCSF) were found to be reliable as shown in Tab. 5 with the values of Cronbach α larger than the acceptable value of 0.7 (Nunnally, 1978).

	Cronbach α
Information Transmission / Teacher Focused (ITTF)	0.831
Conceptual Change / Student Focused (CCSF)	0.848

Table 5: Reliability of Approaches to Teaching Inventory

Hendry et al. (2007) described that a teacher's approach to teaching could be classified as a 'balanced approach' if the difference between their CCSF and ITTF scores was less than 5. A difference of 5 or greater between the CCSF and ITTF scores indicated that their approach could be classified as either CCSF or ITTF, depending on which score was greater. In performing this analysis, results showed that the majority of award-winning teachers in this study could be classified as having a CCSF approach (59%, with only 19% adopting an ITTF approach and 22% adopting a balanced approach).

This trend was evident in a cross-country (Tab. 6) and cross-discipline (Tab. 7) comparison.

	Australia	Hong Kong	Canada	Overall
Information Transmission / Teacher Focused (ITTF)	4	1	2	7
Conceptual Change / Student Focused (CCSF)	9	5	7	21
Balanced Approach	2	3	3	8
Total	15	9	12	36

Table 6: Total Number of Participants by Country Classified by Approach to Teaching

	H&SS	S&T	B&L	HS	Overall
Information Transmission / Teacher Focused (ITTF)	1	4	1	1	7
Conceptual Change / Student Focused (CCSF)	7	4	5	5	21
Balanced Approach	0	2	4	2	8
Total	8	10	10	8	36

Table 7: Total Number of Participants by Discipline Classified by Approach to Teaching

Approaches to Use of Technology

To analyze differences in responses for the questions posed in the technology inventory, a Chi-square test was used. The test compared the frequency of the various categories of responses across variables of country and discipline. For a number of items in the technology inventory there was a general agreement in the responses across countries and disciplines. While there are no statistically significant dependencies in the following responses were noted across countries or disciplines, there were some interesting variations across disciplines as shown in Tab. 8.

Item	% of Agreement by country and by discipline
Students were given online tasks to prepare for class	HK (78%), AUS (60%), CAN (58%) B&L (90%), H&SS (63%), S&T(50%), HS (50%)
Students were given post-class tasks	HK (67%), AUS (53%), CAN (50%) H&SS (75%), S&T (60%), B&L(50%), HS (38%)
The course incorporated online discussion forums	AUS (73%), HK (67%), CAN (50%) H&SS (75%), S&T(70%), B&L(70%), HS (38%)
Students use their personal laptops in class	HK (78%), CAN (67%), AUS (60%) HS (88%), H&SS (75%), B&L(70%), S&T(40%)
Teachers put the lecture notes online	AUS (87%), HK (78%), CAN (42%) H&SS (88%), S&T(80%), B&L(60%), HS (50%)
Power points were used in class and put online	AUS (87%), HK (78%), CAN (75%) B&L(90%), HS (88%), S&T(80%), H&SS (63%)

The use of technology promotes student collaboration	HK(100%), AUS(87%), CAN(75%) S&T(100%), HS(88%), B&L(80%), H&SS(75%)
The use of technology motivates students to get more involved with their learning.	HK(100%), AUS(87%), CAN(83%) S&T(90%), B&L(90%), H&SS(88%), HS(88%)
The use of technology improves students' learning of critical concepts and ideas.	AUS(93%), HK(89%), CAN(75%) S&T(100%), HS(88%), B&L(80%), H&SS(75%)
I was an early adopter of technology	AUS(87%), HK(78%), CAN(58%) S&T(90%), HS(75%), B&L(70%), H&SS(63%)
I am mainly 'self-taught' when it comes to using technology for teaching and learning.	CAN(92%), HK(89%), AUS(87%) S&T(100%), B&L(100%), H&SS(75%), HS(75%)
I feel that staff development around the use of technology should be integrated with pedagogy.	AUS(100%), CAN(100%), HK(78%) S&T(100%), HS(100%), B&L(90%), H&SS(88%)

Table 8: Survey items with high agreement by country and discipline (no significant dependencies)

Four items in the inventory showed statistically significant dependencies in response through a cross-country comparison as shown in Tab. 9.

	% of Respondants	% of Respondants	Chi-square Test (χ^2) with Sig. Result
Reported that students' used in-class computers.	HK (78%)	CAN (42%), AUS (27%)	$\chi^2 = 6.01, p = 0.05$
Reported that the teacher provided lecture notes online	AUS (87%), HK (78%)	CAN (42%)	$\chi^2 = 6.76, p = 0.03$
Reported that the teacher provided digital versions of the class to students in some form such as via course web site, or podcast	AUS (67%)	CAN (33%), HK (11%)	$\chi^2 = 7.66, p = 0.02$
Reported that use of technology promotes the development of students' interpersonal skills (e.g., ability to relate or work with others)	AUS (80%), HK (56%)	CAN (25%)	$\chi^2 = 8.17, p = 0.02$

Table 9: Cross country comparison

Open comments made on the online survey were reviewed along with the more detailed elaborations drawn from the semi-structured interview protocols to look for themes and common issues or challenges around the use of technology. Responses showed that the teachers in this study used technology in a variety of ways to go beyond content delivery. The following themes were identified as shown in Tab. 10 along with selected comments from some of the respondents that exemplify the type of use identified.

Use of visuals
<p><i>"In class, or on the web site, we use YouTube... Google figures, Google maps, I can show how a virus is actually spread from one place to another, shown in real time to demonstrate how to incorporate data and show how the virus actually moves... {when students view the video} in 30 seconds {they have more of an understanding} than I could explain in five minutes...the visual connection, reaches different parts of the brain."</i> (Biological Sciences, HK. Class size 100-250)</p> <p><i>"We {teachers} might put a video {on the course web site} that relates to something that we were reading about or talking about in class".</i> (Law, HK)</p> <p><i>"In my area there are a lot of text books with CDs of all the images and lots of graphics ... and some fascinating simulations this can be done in class and appeal to multiple senses of the students {rather than just giving a presentation} specifically, in anatomy and physiology there is a digital body and students can just slice it up in almost any direction, and look at the various layers ...I would rather have the students</i></p>

doing something which they are physically manipulating because I think the more you can actually do it yourself the more you can actually understanding in...it's not what I'd call true 'hands-on', but they are learning the concepts...if they are doing the simulation, {rather than just watching or listening}”. (Physiology, HK).

In-class use

“I use three data projectors simultaneously in my lectures...they are not necessarily all functioning simultaneously, ... the central one is a Keynote. I use the pp's to provide a framework and structure...it's the raw essence of what they need...they have that all available on the website beforehand, but I don't talk to the pp's - I mean that guides the discussion...on another screen, I have lots and lots of illustrative material and photographs I have taken in the field...On the third screen, I often have Google Earth...it is the most spectacular teaching tool...You really can talk to everybody. I encourage them to, whenever they've got a question, ask me and we do that...I am a geologist and that's my particular branch of science is, it's an intensely visual subject...I am a visual learner and I depend heavily on that in my lectures...My whole style is really centred around bringing the field into the classroom, ... taking them into the field in the classroom.” (Earth Sciences, AUS. Class size 125-450)

“I have started using PowerPoint to show images (rather than words) and to reinforce the concepts...it's a great tool for assisting me to tell the story”. (History. AUS).

“In the 19th century and critical theory area...film clips and audio clips always help.” (English. HK).

“I generally have one major area, one major topic that we are going to discuss in each class...I don't have a problem with if it is a smaller class using a blackboard and a piece of chalk...I always then have three or four internet sites and I encourage them to bring their computer to the classroom...So let's go online and find out...what information we can use and what information we can't use and what's dependable and what isn't dependable”...the computer is a learning not only for making notes, but we're a wireless community...my class becomes very much interactive like that and we share information back and forth within that environment.” (Hospitality and Tourism, CAN).

“In the area of dispute resolution...there is a lot of both of dispute resolution programs, software programs and other initiatives which are completely online that we try to use in the classroom...there's a lot more wholly online dispute resolution process, for example, ebay has setup its own negotiation and mediation system online, - illustrating this to the students and going on to the websites {in class} as well as having them do research presentations on that how the system operates...the new information technologies are helping...in the process of dispute resolution more and more forms of information technology are being used so that's something {the students} actually have to know for practice...dispute resolution is both theory, as well as process- and skill-oriented, it lends itself very nicely to those kinds of {technology mediated} activities.” (Law, HKU).

“We have remote campuses and use video-conferencing from our main lecture theatre to conference with the other campuses...it's more disturbing for the students on the main campus...they find it weird at first...but they get used to it.” (Indigenous Studies, AUS)

Use of the course website

“I don't put all the illustrative material up on the web, I have that... only in the lecture, I differentiate them. My lectures are highly supported in terms of the material available, they {the lectures} have audio recordings integrated with sort of a slide show whatever I am showing only on the central screen or the main screen.” (Earth Sciences, AUS).

“All of my lectures now are on the websites which provides 24/7 assess, and sure you can use it on WebCT course site...I like a website that enables the students to be interactive, you can then put an easy links to take them to other programmes and areas.” (Physiology, HK).

“We have pre-class blogs. We design our own one. In the web site, we have basics such as a chatroom and you could post the PDF file and text...I teach mostly {courses} in microbiology which really become much computerized. I am trying to give {students} exposure to databases, search engines that are specific for utilizing in DNA, RNA, sequences...the students interact on the web site and they start talking to each other... Basically it's a self-designed website and does work well... to be honest with you...I think there is a danger of over-complicating anything with IT because I often see where students get so carried away with the way of design and graphics, they forget about the content of the learning. So, keeping as simple like that in some way, I think is a benefit.” (Microbiology, HK).

"I will post hypothetical questions there [the course website]...a day or a week later, I will then go online and provide what could be considered, as a model answer or a guideline as to what should be covered in the advice given {regarding a legal issue} and students can measure their work against the model answer." (Law, HK).

"In speech pathology we present clinical cases in the online platform...the students move between theories and clinical cases...the main thing is that the students interact with the cases...the other use of the platform is to provide resource information... I may use a video, or speech samples, or some data or an interview. The task is always about theory, and [students have to] solve the problem with the case." (Speech Pathology, AUS. Class size 80-90).

In one of my courses, Bioethics, I run a discussion forum in the class, so students are engaged into the discussion topic throughout the whole semester...it is being marked...based on their participation and also how deep their discussion actually delves into the topic...It's a way of keeping the conversation going after classes and it provides continuous motivation for involvement and assessment until the end of the semester." (Biological Sciences, HK).

"My courses have blogs ...students are required to participate on the blog...Sometime I add something by myself to the blog. I use a lot of videos because I have developed our own videos for the course...students are not allowed technology in the class - no phone, laptop, mobile device, because I want them to think...out of class, I find Blogs, very useful for discussions, especially things that require thinking. It's very easy because you just post one or two articles and you say, "Discuss"...let it go and you stay out of the way." (Accounting, HK).

"Most of our materials are now online, and we have webpages that we use as a course homepage so we can communicate with students both before their class starts and in terms of the materials they should be reading before handing in assignments...also ongoing throughout the semester you can have discussion pages online and compose questions." (Law, HK).

"I started taping lectures and putting up on the WebCT site...the students who came to lecture are the ones who are accessing lecture later, so that was, I think, really good...I have my readings up there, I can have my course outline up there, I can have my PowerPoint and images and images archive up each week...it makes a kind of one-stop shop for students...If they have access to this, they can pretty much get everything they need for the course apart from the stuff they have in the assessments and what they do outside on their own, so that's really great." (History, AUS).

"We have started using a discussion forum and I think that's been quite helpful for the students...Discussion forums have definitely been something that students have taken a liking to...I think that we can use more of those technologies to try to communicate more effectively with students." (Mechanical Engineering, Class size 200, AUS).

Challenges

"Some of them {the students} use it {the course website} well and others don't." (Earth Sciences, CAN).

"We have a modified version of WebCT...the place that I put up documents, lecture notes, other materials that students' needs. I use the discussion forum only if they have got difficulties with assignments, but students tend to send e-mails...When there is a major group work in the subject, I set up a group space where they just have a place to upload documents where they can use it in a blog-style situation for discussing amongst their groups...But then when I reviewed those spaces, maybe two or three out of the 40 groups that I have set up actually used...technology is used in some ways, but quite limited."(Information Systems and Technology, AUS)

"For teaching at remote campuses technology use has actually being successful...but there is more to the technology issue...we were attempting to use a technology to do more and more and I got a bit disillusioned with that. It took a lot of work from me and I wasn't sure how much the students were getting out of it. I tend to find the e-learning stuff very time demanding, for me {and needed a lot of support from the e-learning experts}. I, now, basically use it as a repository...in another subject, we used an online quiz...this was with 200 or 300 students, so it was a huge number...part of it [online quiz] worked, but bits of it always didn't work and managing that was just a nightmare...Typically, students made some mistakes with the technology and it was fairly unforgiving, and then they freak...It just takes a lot of time managing that stuff. We have moved now away from that [online quiz] again. Also, when you set up the quiz, the first time, you have to put in all the questions and all those things and it is very time-demanding and it then becomes inflexible." (Indigenous Studies, AUS).

"In teaching in the undergraduate nursing program we have three campuses...I find that the technology can be restrictive because we are not allowed to add things unless all students can access... it restricts our ability to ask questions, but has positive aspects as well." (Midwifery, AUS).

Table 10: Themes and selected comments

Discussion and Educational Implications

This study was designed to explore the approaches to teaching and the use of technology by faculty in Canada, Australia and Hong Kong who had been awarded local, regional, or national teaching awards while teaching at research intensive universities. The paper provides a descriptive report of the findings from online inventories and in-person interviews with a goal of providing a snapshot of the actual teaching practices in the use of technology by these award winning teachers. The paper does not suggest that a one size fits all approach is appropriate but hopefully will provide some examples of good practice, as well as demonstrate the need for staff development around technology implementation.

An interesting finding was that the majority of award winning teachers answered the questions in the Approaches to Teaching Inventory in a way that demonstrated that they were more likely to adopt a Conceptual Change/Student Focused approach (CCSF) rather than an Information Transmission/Teacher Focused (ITTF) approach to teaching. Regardless of country or discipline, the tendency to take to adopt CCSF approach was the most prevalent and this finding was statistically significant. This approach seemed to carry over into their descriptions of the range of technology they used that was often described as a way to encourage communication about the course and a way for students to see visual images of concepts and topics such as *"You get feedback from students and {they find it} much more easy to absorb the concepts and in principles"*. (Biological Sciences, HK), *"I am really having a conversation with them [students]...and it's exciting"*, Earth Sciences, AUS, *"I just think that we can use more of those technologies to try to communicate more effectively with students"* and *"My class becomes interactive and we share information back and forth in that environment."* (Hospitality and Tourism, CAN).

All of the participants indicated that they used technology to some extent. A majority indicated that they had started to use technology because they were 'an early adopter'; however, there was also an interesting variation across faculty in terms of being an 'early adopter' in that the largest number of 'early adopters' were from the Science and Technology area (90%) followed by Health Sciences (75%), Business and Law (70%) and Humanities (63%). It may be that some departments are more naturally prone to adopt the use of technology because of the discipline and require less support. While most of the faculty indicated that staff development programs had only 'somewhat' influenced their decision to use technology, there was strong support for the belief that staff development around the use of technology should be integrated with pedagogy (95% agreement) and the majority reported that they had participated in staff development activities that helped them to use technology in teaching and learning (65%). Resources for additional scaffolding of instruction might be directed to faculties with a lower uptake of new technologies and also cross-departmental sharing might be encouraged to showcase some of the technologies used by departments that have been more progressive in implementing enhanced online learning environments. Faculty comments also support the need for technology training to be a part of staff development programs and there seems to be support for the notion that training should be integrated into professional development as a part of 'best practice'. Comments on the challenges of using technology, especially when institutions seem to support one system over others described the tensions that can arise if there is not support for multiple system, *"For the effective use of technology in the classroom and for subject websites, it is critically important that the university spend time investing in IT...also, as a Mac user in a PC university it was often difficult to get help so I had to teach myself a lot of the critical information."* (History, AUS)

Many teachers commented on the importance and usefulness of technology exemplified in the following representative comment *"technology is an absolute requirement in all my courses...the students love it and by having access to the learning web site...they come to class prepared and then are given a 'blog' or something to set up online so they can start talking to each other online"* (Biological Sciences, HK). The use of terms such as 'learning web site' indicate that this teacher uses the web for more than just depositing content resources; he later described active online learning strategies to support learning that helped students to prepare for class. However, he went on to comment that *"very few teachers in my department use IT and this is a missed opportunity to enhance student learning"*. Other respondents echoed this view *"Technology should not be used just for the sake of it. However, I have noted that many university lecturers are highly incompetent in this area and their teaching suffers as a consequence."* (Chemical and Biomolecular Engineering, AUS)

Sometimes, faculty may avoid embracing new technology options as they associate technology use with only the most 'cutting edge' or complex of applications that are perceived to be both time consuming and challenging technically. The approaches to the use of technology described in this paper are not necessarily complex, or difficult applications, but rather are readily available tools that could be used more effectively in the mainstream to enhance learning and teaching. Many respondents expressed the view that programs for staff professional development around technology implementation are needed, as expressed in the following eloquent summation, "*There is no doubt that the use of technology in teaching, is, of itself, neither a good nor a bad thing. Like more traditional teaching modes, its effectiveness depends very much on the teacher and how it is used. It is also clear that the teacher needs to make a significant investment in learning the requisite skills, but this investment of time and effort usually repays itself handsomely in terms of greater efficiencies in terms of on-going preparation time and in terms of enhanced communication with and between students. In the hands of an imaginative teacher, technological support can result in an extremely effective learning environment for the students, and indeed many students today expect this level of support. For some teachers it is essential that additional support be provided to give them the necessary technological skills.*" (Earth Sciences, AUS).

When guiding faculty in a sound pedagogical framework for using technology is added to the role of academic staff development, additional challenges are placed on institutions and faculty. Staff development that helps faculty recognize their approaches to teaching, and how their approach influences their practice merits further study. Further exploration of how award winning teachers do, or do not use technology may help academic developers compile examples of good practice that may be shared in staff development programs to help more university teachers achieve success in using technology to enhance learning and teaching.

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