eLearning adoption: Staff development and self-efficacy

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The influence of staff development on the adoption of eLearning in the tertiary sector has been identified by a number of researchers. While different models of staff development are used in New Zealand organisations, it was unclear prior to this research which models helped staff develop capability and confidence in using new technologies for teaching. This article reports the findings of a project aimed at investigating the range of eLearning staff development models and their effectiveness in New Zealand tertiary education. The foci for the research were: the range of staff development models offered by a sample of New Zealand tertiary providers; how staff development models prepared academic staff for eLearning and the relationship to self-efficacy and why some models were more effective than others. A range of methodologies were used - focus groups, one-to-one interviews, questionnaires and case studies. Most participants had undertaken formal staff development of some kind, and all used a wide range of strategies for informal learning. The researchers concluded that existing formal staff development models were not regarded as adequate to assist staff to fully develop their capability and potential for eLearning, and many staff were engaging in a range of informal staff development activities.

Keywords: staff development, eLearning, self-efficacy, capability, competency

Introduction

This project was conducted to investigate whether staff development in eLearning, at six institutions in New Zealand, helped staff develop their capability and confidence to utilise new technologies for teaching. This project uses the terms eLearning — the use of multimedia technologies (e.g. Internet-based, CDROM technologies, video, audio, teleconference) as resources for learning — and eTeaching — the use of multimedia technologies for teaching.

At the time of the research, several different models of staff development were being used for eLearning in New Zealand. These ranged from the more formal: competency-based training ICT skills, capability-based professional development, to the informal: peer mentoring and 'just in time' support. The researchers believed that capability in eLearning was wider than just the acquisition of technical skills (Ellis and Phelps, 2000; Phelps, Ellis, and Hase, 2001; Phelps, & Ellis, 2002; Phelps, 2005) and required staff development activities that would help staff overcome fear and anxiety, motivate them to become involved in new technologies for teaching and develop a clear appreciation of pedagogy related to eLearning.

Further issues seemed to be that where staff were inadequately skilled for eTeaching, course development for online delivery was often kept at a basic level with the provision of course notes and some email communication. Additionally, the development and design of courses which fully embraced what many authorities believe are quality indicators, e.g. resource-based learning (RBL) and constructivist methods, appeared to be limited. In the interests of quality eLearning, several researchers and quality assurance bodies have looked for a connection between quality learning experiences and skilled staff (Hegarty, 2004). It appeared that low level ICT skills, as well as an unwillingness to experiment and try new ways of teaching, was linked to self-efficacy (the belief people have in their own abilities to perform in particular areas - Pajares, 2002) and success with eLearning. It was believed that a research project to examine existing staff development models and their effectiveness would inform future professional development strategies for eLearning both nationally and internationally.

A literature review was undertaken so that a comparison among staff development models could be made and information gathered about factors affecting adoption of eLearning, self-efficacy and eLearning and institutional efficacy (Hegarty, Penman, Nichols, Brown, Hayden-Clark, Gower, Kelly, & Moore, 2005). The literature was also used to help establish baseline questions for the online questionnaire in the areas of staff development, self-efficacy and technology.

Methods

A range of qualitative and quantitative data collection and analysis techniques were used in order to provide answers to the research questions.

1 What is the range of eLearning staff development (SD) models offered by New Zealand tertiary providers?
2 How do SD models prepare academic staff for eLearning? That is, are staff experiences of eLearning and levels of self-efficacy related to the type of staff development provided?
3 Why are some staff development models more effective than others?

To understand the first question, volunteers in focus groups were asked to consider their experiences with eTeaching and eLearning. The transcriptions from these focus groups helped the researchers develop an overview of the situation regarding staff development in tertiary institutions in New Zealand, and to develop sampling tools, i.e. inform terminology and questions for the online questionnaire.

To find answers to the second and third questions a two part questionnaire was developed and interviews were conducted. The self-efficacy section of the questionnaire was developed in consultation with a clinical psychologist. In the questionnaire, five aspects of self-efficacy, i.e. confidence with respect to eLearning, were categorised as follows:

1 Personal efficacy using computer technology/eLearning tools and methods for teaching.
2 Confidence using eLearning tools.
3 Confidence when undertaking a project to set up an online course.
4 Personal characteristics when learning new software or using eLearning tools and facilities.
5 Overall confidence in using eLearning tools and methods in teaching.

Responses to questions in each of the five categories were scored to determine levels of self-efficacy in each different type of situation. (Scores were reversed for negatively-oriented questions.)

An expert panel critiqued the entire questionnaire. The questionnaire was administered online and was followed by interviews with up to five staff at each of six institutions, allowing for more in-depth discussion.

Content analysis was undertaken of qualitative data from the questionnaire and from interview transcripts. Content analysis, as an interpretive method, allowed for themes to emerge from the texts and the voices of the participants to be heard. From the data, two types of case studies were developed: the first being individual situations related to staff development and eLearning, and the second based on the themes which emerged from content analysis of the online questionnaire and interviews. These provided a

snapshot of specific examples and also an overview of what was happening in eLearning in the tertiary sector in New Zealand.

All researchers participated in the focus groups, one-to-one interviews and development of the questionnaire, while the lead researchers completed the content analysis and case studies. Weekly conference calls helped keep the researchers in touch and on task.

A total of 82 participants across a sample of New Zealand tertiary providers completed the online questionnaire which had three sections: general information (demographics), self-efficacy for eLearning and staff development (Hegarty, Penman, Brown, Gower, Coburn, Kelly, Sherson, Suddaby, & Moore, 2005). Additionally, a total of twenty-seven participants were interviewed after they had completed the online questionnaire. Participants exhibited a range of experience with eLearning and eTeaching, and a representative cross-section was sampled using interviews. Findings from the project are described in brief and organised as follows: (i) focus group findings, (ii) questionnaire results – demographics, self-efficacy and staff development – (iii) interviews and (iv) case studies.

Results

Focus group findings

A range of formal staff development options were provided in institutions and focus group participants also utilised a range of informal staff development strategies. These were later categorised by the research team as peer support, organised and expert support and individual pursuits. All these options were included in the content of the questionnaire.

Questionnaire results

Demographics
The respondents' ages ranged from 27 years to 67 years (mean=48, SD=8.6), and there were 31 males compared to 49 females and two undisclosed. Participants were primarily lecturers or tutors, and also included professors, course advisors, consultants, programme managers, instructional designers and a Kaiwhakahaere Tikanga Ako (Maori Learning Specialist). Years teaching ranged from 2 to 45 (mean=16.8, SD=9.8; median=15), and years e-teaching ranged from a minimum of 0 to a maximum of 20 (mean=3.49, SD=4.1; median=2) (Table 1).

Twenty-four percent of respondents were studying for qualifications which encompassed eLearning, and twenty-three respondents had already obtained qualifications in eLearning.

Table 1 shows correlations between four variables: overall self-efficacy, years of experience with eTeaching, and the percentage of the respondent's role that involved eTeaching (eLearning tools and methods) in 2004 and in 2005.

There was no relationship between overall self-efficacy and years eTeaching ($r = 0.14$, $p = 0.21$) or percentage eTeaching in 2005. There was, however, a moderate association ($r = 0.358$, $p < 0.001$) between percentage eTeaching in 2004, and the overall self-efficacy score. As might be expected, there was a correlation ($r = 0.542$, $p < 0.001$) between years eTeaching and percentage eTeaching in 2005; however, there was no significant relationship with percentage eTeaching 2004.

Table 1: Relationships between eTeaching and efficacy (n = 82)

Comparison of eTeaching and Self-Efficacy	Overall self-efficacy	Percent eTeaching 2004	Percent eTeaching 2005
percent eTeaching 2004	0.358*		
percent eTeaching 2005	0.092	0.163	
years eTeaching	0.140	0.270	0.542*

Aspects of self-efficacy and eLearning

As mentioned above, self-efficacy was measured in terms of five aspects: one 'overall' and four dealing with more specific aspects of self-efficacy and eLearning/eTeaching. The 'overall' aspect is presented first (Table 2).

The mean overall self-efficacy score was 3.8 (on a scale from 1 – 5): that is, somewhat above the mid-point on the Likert scale. Interestingly, 48% of participants indicated their overall confidence (self-efficacy) was high, and an additional 22% indicated very high confidence. In comparison, 13% of responders rated their level of overall confidence as low or very low.

Table 2: Category five - Overall confidence
Mean, median and mode self-efficacy scores and distribution of responses (n=82)

	Efficacy Scores			% Frequency of Responses				
Overall Confidence	**Mean**	**Median**	**Mode**	**1**	**2**	**3**	**4**	**5**
Overall, how confident using using eLearning tools and methods	3.8	4	4	4	9	18	48	22

Self-efficacy ratings selected by participants were generally high to very high for all five categories (Figure 1). For example, 88% indicated high or very high personal efficacy for eLearning, and 84% believed they had the necessary characteristics for eLearning.
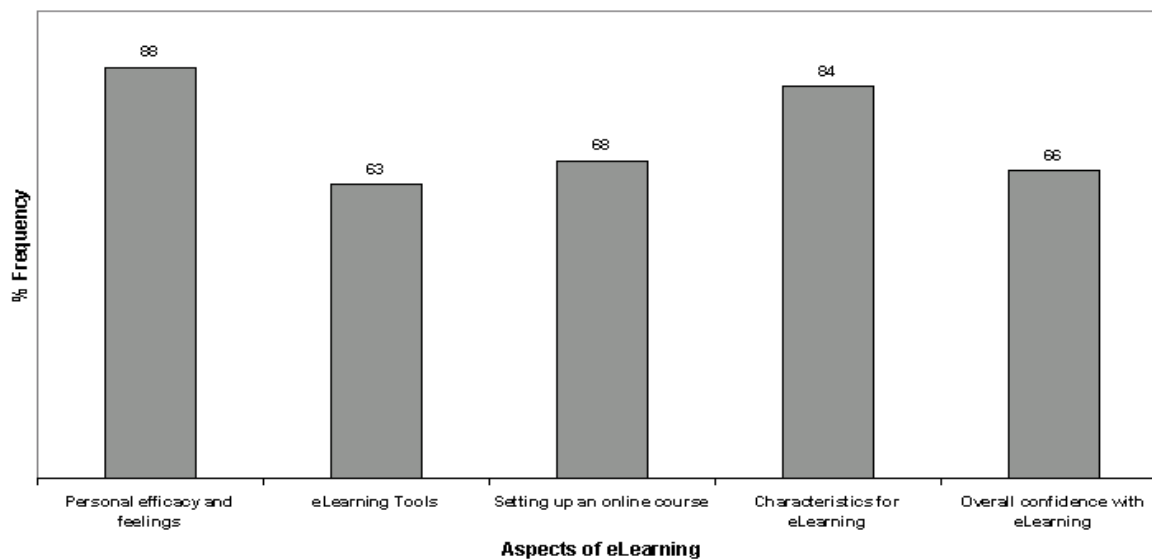

Figure 1: Frequency of high and very high efficiency for five aspects of eLearning (n=82)

For each question relating to each of the categories of self-efficacy, mean self-efficacy scores were calculated as well as descriptive statistics such as median and mode (Tables 2 to 5). Apart from the overall confidence category for which there were no sub-questions, categories of self-efficacy are summarised in Tables 3 to 5. An overview of results for each category is presented in the following sections.

Category one: Personal efficacy and feelings about using computer technologies
Most notably for this category, combined scores for Likert scales 4 and 5, indicate that academic staff felt at ease learning about computer technologies (83%), and confident about their ability to teach well using them (77%). However for 80%, the thought of using eLearning methods was uncomfortable and 69% percent felt anxious about using eLearning tools (Table 3). The mean score for "learning how to be an eTeacher is easy" (2.8) was the lowest for all the sub-questions, which suggests that for most participants confidence does not equate with easy achievements.

Category two: Confidence using eLearning tools
The tools which participants had a high level of confidence using were email (82%), PowerPoint (77%) and text-based materials (75%). Also 62% of the responders were confident using learning management systems (LMS) and discussion boards, and 50% were confident with chat. The tools where participants were least confident were web pages (38%) and video streaming (35%). There were a small number of other tools used such as: PDF files, interactive tutorials, email lists, providing material via CD, DVD and video, library journals and information databases. Mean efficacy scores for using fourteen specific kinds of eLearning tools ranged from 1.6 for audio, through 2.6 for quizzes to 4.0 for email. When efficacy levels were scored, frequencies were adjusted to account for the tools not used.

Table 3: Category one - Personal efficacy and feelings
Mean, median and mode efficacy scores and frequency of responses (n=82)

| | Efficacy Scores | | | % Frequency of Responses | | | | |
| | | | | Likert Scale | | | | |
Personal Efficacy and Feelings	Mean	Median	Mode	1	2	3	4	5
confidence to teach well	4.1	4	5	0	6	17	33	44
at ease learning	4.2	4	5	0	7	10	33	50
concerned about impact	3.3	3	3	15	13	26	24	22
not worried about mistakes	3.6	4	4	2	22	17	30	28
anxious using tools	3.9	2	1	2	13	16	26	43
thought of using is uncomfortable	4.2	2	1	1	5	15	48	32
tools enhance teaching	3.9	4	4	2	7	17	39	34
learning is easy	2.8	3	3	11	33	37	12	7
enjoy using tools	3.9	4	4	5	4	22	39	30

Category three: Confidence for setting up a course for online delivery
The researchers found that there were four situations where participants felt they had the highest levels of confidence. Participants were more likely to feel confident when they had a lot of time; were able to call someone for help, had help getting started and/or had step by step instructions to complete their project.

If the participants didn't have any help in setting up their online course, then they had low self-efficacy (mean = 2.9), whereas self-efficacy rose where they had plenty of time to complete their project. The complete range of efficacy scores is depicted in Table 4.

Table 4: Category three – Setting up an online course
Mean, median and mode efficacy scores and frequency of responses (n=82)

| | Efficacy Scores | | | % Frequency of Responses | | | | |
| | | | | Likert Scale | | | | |
Setting up an Online Course	Mean	Median	Mode	1	2	3	4	5
no help as go	2.9	3	4	16	21	27	30	6
only instruction manual	3.1	3	4	10	24	23	33	10
call someone for help	4.1	4	4	1	11	6	44	38
help getting started	4.1	4	4	0	6	15	46	33
lot of time	4.3	5	5	2	5	7	34	51
step by step instructions	1.9	5	5	54	16	21	7	2

Category four: Personal characteristics
Participants were found to have some characteristics which stood out when learning new software or using eLearning tools and facilities. They did "spend extra time trying to understand what to do" (84%), "put a lot of effort into getting it right" (84%). On the other hand, a small number (9%) did not "give up quickly if it doesn't work". The lowest mean efficacy score in this section was 2.5 for "need to ask others

for help", indicating a characteristic related to low efficacy. On the other hand, a mean efficacy of 4.1 for "put a lot of effort into getting it right" was a characteristic indicating high self-efficacy. (See Table 5.)

Table 5: Category four – Characteristics using eLearning tools
Mean, median and mode efficacy scores and frequency of responses (n=82)

Characteristics using Tools	Mean	Median	Mode	Likert Scale				
				1	2	3	4	5
expect problems	2.9	3	4	9	32	28	22	10
doubt ability to solve problems	3.6	2	2	2	15	18	46	18
ask others for help	2.5	4	4	16	39	28	13	4
persist on own	3.6	4	4	2	9	28	46	15
give up quickly	4.0	2	2	2	7	13	40	37
lot of effort	4.1	4	4	1	9	6	49	35
ask immediately for help	3.1	3	2	5	26	27	35	7
someone else to fix	3.6	2	2	6	10	23	38	23
spend extra time to understand	4.0	4	4	0	7	9	61	23
get frustrated at lack of progress	-	3	3	10	20	33	26	12

Additionally, six features of self-efficacy were selected as most important for measuring the rest of the responses against (apart from those for eLearning tools). These are shown across the top of Table 6, along with scores which showed evidence of correlation.

Table 6: Significant relationships between efficacy scores
of six features of efficacy and questions

Six Features of Efficacy	Overall efficacy	Confident in ability to teach well	Not worried about making mistakes	Learning to be an eTeacher is easy	No-one around to tell what to do as go	Try and persist on own until it works correctly
Questions	**Pearson's Correlation Coefficient (r)**					
I am confident about my ability to teach well in a course that requires me to use computer technology.	0.879					
I feel at ease learning about computer technology.			0.446			
I feel anxious about using eLearning tools*			0.356*			
I enjoy using eLearning tools				0.316		
If you had only an instruction manual for reference					0.679	
If you could call someone for help if you got stuck					0.497	
Expect that I will experience many problems*		0.356			0.321*	
Put a lot of effort into getting it right						0.376

Note: All r values shown in the table are statistically significant (p<0.01).   * Efficacy score reversed

Most significantly in Table 6, it can be seen that if participants were confident about their ability to teach well in a course that required them to use computer technology, they also felt they were confident overall in using eLearning tools and methods in their teaching ($r = 0.879$, $p < 0.01$). Also participants who were confident if they had only an instruction manual for reference were also confident if no-one was around to tell them what to do as they went ($r = 0.679$, $p < 0.01$). And it should be noted that if participants feel at ease learning about computer technology they were not worried about making mistakes when using it for teaching ($r = 0.446$, $p < 0.01$).

Staff development

The results for this section of the questionnaire include data relating to both formal and informal methods of staff development as well as learning strategies and applications of staff development to eTeaching. Participants were asked about the types of staff development they had undertaken in preparation for elearning over the last 10 years. Definitions were provided for formal and informal staff development and developed following feedback in the focus groups.

Definition of formal staff development:
Courses/workshops as well as staff development that might occur through mentoring or facilitating. The type of staff development included here is formally recognised, part of your workload, possibly remunerated and may or may not be driven by Staff Developers.

Definition of informal staff development:
Informal staff development takes place outside of structured or contracted learning situations. It is not formally recognised, may not be a recognised part of workload, is not remunerated, and may or may not be driven by Head of School/Department, Dean or Staff Developers.

Participants had most frequently attended courses at their own institution which covered online teaching and learning instruction – technical, followed by general computing instruction, then online teaching and learning instruction – pedagogical and lastly specialist software instruction.

It was difficult to determine a relationship between the amount of formal and informal staff development undertaken because these variables were measured differently. However, across all institutions face-to-face workshops for eLearning training were found to be the most common delivery mode, followed by online and one-on-one modes. Also, the highest percentage of people had taken one or two sessions of formal staff development, and most people undertook formal staff development at their own institutions.

As far as informal staff development went, across all institutions, the highest numbers of people chose items such as general internet use (62%), reading/websites/ personal resources (61%), discussion with peers (59%), and working with early adopters/peers (52%) as their most preferred methods for learning informally. Often these informal methods were the only means available to them for up-skilling for eTeaching. The most commonly chosen strategies were to communicate with an existing practitioner (64%), utilise a trial and error approach (59%) and access web-based resources (47%). Strategies which promoted learning at a reflective or metacognitive level, e.g. blogging, portfolio development and reflective journaling, were not popular. Overall people liked to experiment and use just-in-time methods to learn as well as engaging in projects and courses. For most participants, both formal and informal staff development was regarded as useful in shaping eTeaching.

Some key comments about different ways of learning included the following:

- "Having a sound knowledge of technology and pedagogy assisted as one could focus on learning the eTeaching tools and eTeaching methodology";
- "Many years of participation in e-lists, discussion forums and chat has shaped my understanding of on-line communities";
- "I have learned a lot from working informally with an on-line group at a … university as a 'visitor' to the site";
- "Helped to develop relationships which may not have been forged so easily".

Interviews

The data from the interviews was used along with the questionnaire data to formulate both individual case studies and a case study depicting staff development and self-efficacy across the six institutions. Detail about the case studies can be found in the full report along with descriptive data provided by responders to the questionnaire (Hegarty, et al., 2004). A brief overview of the case studies is provided in the following section.

Case studies

From the data, two types of case studies were developed: those relating to individual situations and those based on the themes which emerged from the content analysis of the online questionnaire and interviews. These provided a snapshot of specific examples and also an overview of what was happening in eLearning in the tertiary sector in New Zealand.

The individuals for the case studies were selected to ensure a balance across areas, e.g. years of eTeaching, percentage of teaching delivered online, employing institution and gender. The case studies showed differences relating to experience of eTeaching, qualifications and self-efficacy. The results reflect the range of diversity of the eTeaching community.

The themes emerging from the content analysis of the interviews, focus groups and questionnaires and forming the case studies of self-efficacy and staff development were:

- Self efficacy for eLearning;
- ELearning tools and methods;
- Staff development;
- Learning strategies for teachers;
- Application of staff development and eTeaching methods;
- Suggestions from participants.

Characteristics were identified which indicated that the majority of the participants were confident to tackle the challenges that eLearning imposed. Participants in the study group had reached a reasonable level of aptitude with regard to some of the basic eLearning tools e.g. email, PowerPoint and learning management systems. There was a feeling that both technical and academic support for eLearning had improved since the "early adopter" days. The need for 'just in time' support as well as the opportunity to go to courses was regarded as important. Suggestions were made about how challenges could be managed and they all related to having adequate technical and staff development support.

The majority of participants had taken part in both formal and informal staff development. The feeling was strongly expressed that just learning about the technical aspect was not sufficient and more attention needed to be paid to pedagogy and design for eLearning. A mix-and-match approach which included formal and informal staff development related to the individual needs of the staff member worked best. Learning strategies included peer support, trial and error, web-based resources, feedback from students and staff development activities. Metacognitive strategies such as journaling, blogging and portfolios were less widely used. Like staff development there was no one learning strategy which everyone used and which worked, rather a range of approaches.

Participants were teaching in a range of areas and courses and using eLearning innovatively, however, many participants were still unsure about how to approach eTeaching and the design and development of eLearning courses. Participants made a number of suggestions which included: making the whole process around eLearning and eTeaching more amenable for academic staff, having a team approach to development and lecturers thinking 'outside the square'. If institutions used eLearning to attract more students then it was felt that they needed to support staff fully through good staff development, instructional design and production support, adequate and up to date technology in classrooms, sufficient computer labs and Internet access for all students.

Discussion and conclusion

The evidence gathered in this research has demonstrated that there were a wide range of staff development models being accessed and strategies in use by participants, but only a small number were actually offered formally. Overall, participants used a breadth of informal activities and learning strategies to prepare themselves for eLearning. There was no definitive evidence to demonstrate that one type of staff development was any more effective than another type, rather a variety of staff development methods and learning strategies were used to prepare academic staff for eLearning. The findings did not

make it possible to ascertain which specific learning strategies, or particular type of staff development, directly enhanced self-efficacy for eLearning, or had a subsequent impact on course design and development.

There was sufficient evidence, however, to indicate that a combination of both competency-based and capability-based strategies in particular for staff development in eLearning were used. For example formal training was combined with a range of informal self-directed learning methods. For complex environments such as eLearning environments, research has shown there is a need for more complex models of learning. For example, Phelps, Hase and Ellis (2005) describe capability-based learning as more functional in the long term, because it deals with complexities when applied to computer learning. They also state that capable computer learners tend to function in what is called the "edge of chaos", and are more pro-active in their adaptation to a new environment. Phelps et al (2005) recommend the use of reflective journals and other metacognitive strategies to promote what they refer to as "divergent pathways" (p. 12), and to help individuals "gain insight into the significant impacts on their learning" (p. 14). Where individuals remain on a competency-based pathway, they are likely to "stagnate" (p. 186) in their learning and will continue to require external stimuli to gain new skills (Phelps, 2002). Certainly the majority of participants in the present study appeared to be proactive in their approaches to keeping abreast with eLearning developments.

Other factors which emerged from this study relate to some of the problems and challenges which faced participants when they engaged with eLearning. For example: most people were unsure of the appropriate pedagogies to use for eLearning; institutional support in the way of incentives and time release was regarded as important for staff development and course development; prioritising eLearning within existing roles and setting realistic workloads for eTeaching were seen as necessary. Other factors included having readily available technical support, and support for design and development of course materials, along with the provision of adequate equipment and software. A full investigation of these issues was outside the brief of this project, but they mirror the findings of many other studies reviewed by Mitchell, Barr, Bright, Clayton & Gower (2004) and Hegarty et al (2005), and as such warrant further investigation. Additionally, participants wanted to have time to be able to explore and trial technologies which supported the type of teaching they wanted to provide, rather than having to fit their teaching to the technology provided. Essentially, this group of participants consisted of very dedicated and experienced teachers who wanted to provide quality learning experiences for their students, and enjoyed what they were doing. They wanted time to explore eLearning and keep up to date so they could continue to teach effectively. Additionally, they wanted to be involved in decision-making and be supported appropriately, so they could move forward and keep abreast with the changes which were occurring in education.

This research evolved into a complex study providing rich and very interesting data. The majority of participants demonstrated high self-efficacy for eLearning, had some experience in eTeaching, and had attended formal staff development workshops. As well, they engaged in a variety of informal staff development activities and used a range of learning strategies. The outcome of the project has provided some answers to the research questions about the range of staff development models and how they prepared staff for eLearning. However there were no definitive answers about the effectiveness of the models. Bearing this in mind four main findings are listed:

1 The staff development models in use across six tertiary institutions in New Zealand were very similar – training workshops for technology and learning management systems, qualifications, just-in-time, peer support, mentoring.
2 Participants engaged in a wide-ranging amount of informal staff development activities because of a number of factors, for example, (i) participants' interests were wider than what formal staff development had to offer, and (ii) time and workload constraints.
3 Existing formal staff development models in the six institutions sampled were not always adequate to assist staff to fully develop their capability and potential for eLearning.
4 The findings of this project were consistent with research elsewhere in the New Zealand tertiary sector, for example, in relation to factors impacting on staff who engage with eLearning (Mitchell, Clayton, Gower, Barr & Bright, 2005) and some of the impediments which may affect adoption of eLearning, e.g. time and adequate support. Additionally, the findings mirror recommendations in the literature regarding the need for varied approaches to staff development and the need to build capability, as well as identifying barriers for staff to eLearning (McNaught, Phillips, Rossiter, &

Winn, 2000.; National Staff Development Council, 2001; Haddad and Draxler, 2002; Hegarty 2004; Hegarty et al, 2005; Mitchell et al, 2005; Phelps et al, 2005).

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