Digital Information Literacy:

Supported Development of Capability in

Tertiary Environments

Final report

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Introduction and Problem Definition

Digital information is becoming essential to almost every aspect of modern life which means that there is a need as never before, for learners and teachers who are information literate in a digital context. Tertiary students require digital information literacy, and a degree of skill using computers and the Internet for many aspects of study at this level, for example, enrolment, accessing online course materials, preparing assignments, checking grades and communicating with teachers. The resulting tertiary graduates with digital information capability will be essential players in the workforce in a knowledge-based society.

According to the New Zealand Digital Strategy (Ministry of Economic Development, 2008), there is an urgent need for the key players in a digital future i.e. learners and teachers. This phenomenon was eloquently stated by Marshall (2006): "Critically, capability includes the ability of an institution to sustain e-learning delivery and the support of learning and teaching as demand grows and staff change" (p. 7).

This research project was an investigation of the strategies and tools associated with developing the digital information literacy capability of staff and students from four tertiary institutions in New Zealand. The components of digital information literacy essential for lifelong learning in the workplace, and a comparison of standards with other OECD countries were also anticipated as part of the outcomes. A primary outcome was the development of a definition of digital information literacy for Australasia. This definition was based on findings from the project and existing information literacy standards used by the Australian and New Zealand Institute for Information Literacy (ANZIIL). In addition it was informed by international research in the area of digital information: American Library Association (1989); the 21st Century Digital Information Fluency Model (2009); and the Seven Pillar Model for Information Literacy (SCONUL). The literature review which informed the research project has more detail on these and other relevant research and is published separately to this summary.

Definition of Digital Information Literacy

Digital Information Literacy (DIL) is the ability to recognise the need for, to access, and to evaluate electronic information. The digitally literate can confidently use, manage, create, quote and share sources of digital information in an effective way. The way in which information is used, created and distributed demonstrates an understanding and acknowledgement of the cultural, ethical, economic, legal and social aspects of information.

The digitally literate demonstrate openness, the ability to problem solve, to critically reflect, technical capability and a willingness to collaborate and keep up to date prompted by the changing contexts in which they use information.

Research Questions

Four research questions were framed from the areas for investigation identified in the call for proposals in line with the literature review and the expected outcomes for the research.

1. Investigate how staff and students access, and interpret digital information creating their own understandings, using purpose built modules which are customisable and/or Web 2.0 strategies.

2. Ascertain how personal online learning environments and membership in a social networked community can influence digital information literacy.

3. Indicate how important digital information literacy is for lifelong learning of staff and students (including Māori and Pasifika), productivity and innovation.

4. Determine the standard of digital information literacy in the New Zealand academic workplace compared with other OECD countries.

Methodology

The research design was action research with a case study (Halonen, 2008), and involved groups of participants located at each of the four institutions (two polytechnics, and two universities) taking part in the project. In total 42 participants, comprising academic staff, general (allied) staff and students were recruited, engaging in face to face workshops over a period of ten weeks. Many academics identified themselves as both staff and student for the purposes of the research because they were involved in study at the time.

Action research methodology was chosen because it creates the expectation that those involved will be researching a particular situation with the intention of taking action that will make a difference, bring about change or improvement, and solve problems while engaging in ongoing learning to improve practice (Riel, 2007; Coglan & Brannick, 2002). It was anticipated that the action research process to be used at each of the four institutions would bring about changes in participants' digital information literacy.

A mix of qualitative and quantitative methods were used to collect data within the action research framework including pre and post surveys, face to face workshops and participant reflections from weblogs (blogs). This multi-strategy or mixed methods approach (Bryman, 2000) was deemed to be the most complete method to allow fuller analysis of the empirical data. It also brought together the qualitative and quantitative aspects of the investigation, but supported separate quantitative data analysis from pre and post surveys. A mixed methods approach for handling data is also recommended for negotiating the complexity of digital systems (Reeves & Hedberg, 2003).

The Taxonomies

Key to the qualitative analysis were two taxonomies (DIL and Capability) which were adapted from others' work for the purpose of investigating participants' skills and capability in managing digital information. These two taxonomies informed the following:

- Processing of the material gained from the workshops;
- The focus group interviews;
- The participant reflections and action research cycles ; and
- The email discussions.

The qualitative data along with the quantitative data comprised the creation of the individual and institutional case studies. The case studies were compiled as a way to both analyse and present the findings. They were combined to produce an overarching case study from which to consider the research questions.

The survey data were used to calculate a Digital Information Literacy (DIL) score for each participant. Survey responses were compiled from a series of questions such as:

- Digital skills for accessing and using information;
- Confidence in using technologies for information;

- Actual use of digital tools and confidence in using tools; and
- Scores of self-efficacy in using information communication technologies.

The DIL score for each participant was used for before and after project comparisons as well as for commenting on similarities and differences between the participants and within and across institutions.

Digital Information Literacy Taxonomy

Six aspects were used in this taxonomy to identify an information literate person in a digital context:

1. Recognition (of the information needed);
2. Access (obtaining the information);
3. Evaluation (of the reliability of the information and the effectiveness of the tools and strategies);
4. Management (of the information found);
5. Application (to create new understandings); and
6. Ethical use of information.

Additionally, a capable ICT (information communication technology) user is regarded as having particular dispositions (characteristics) including the ability to learn as opposed to knowing everything there was to know about technology. The characteristics associated with knowing how to learn include:

- The ability to "experiment or play" through "trial and error";
- Be self-directed;
- Being able to "consult others" such as peers or a mentor (Phelps, 2002, p. 270).

Capability Taxonomy

This taxonomy utilized seven categories based on the dispositions of a capable ICT user within the digital environment:

- Confidence (in own ability - self-efficacy);
- Problem solving (identifies and works towards a solution);
- Motivation (positive attitude to explore and adopt new approaches - including risk-taking);
- Interaction (shares, collaborates and interacts);
- Reflection (examines practices and thinking of self and others - including evaluation);
- Technical aptitude (uses a wide range of tools and terminology); and
- Beliefs (values the ICT environment).

Key Findings

The results of this research project indicated that regardless of whether they were academic or general staff or students, the majority of participants made positive shifts in their digital information literacy skills and capability. For the majority this manifested as an increase in their DIL scores and changes to the way they used and managed digital information. This included a change in attitude towards more open sharing of information and a willingness to learn new technologies. The participants were primarily female and New Zealand European with a small number of other ethnicities, e.g., Maori, Samoan, Chinese, and Indian. Most participants had three years or more computer experience and Internet experience.

In the four groups were participants who demonstrated quite distinct characteristics or dispositions and skills for digital information literacy. However, they were remarkably similar in many areas. For example, they were willing to share information and collaborate in a group and explore new

approaches to managing digital information. The groups were characterised by their diversity of participants. This fertilised imagination as well as providing complementary skills and enabling alternative approaches to understanding technological approaches and a digital world. Although differing in the extent to which they did this, the groups all appeared to create safe, collaborative learning environments. All groups reported improvements in technical skills, confidence and motivation. Additionally, participation in a group expanded participants' understanding of the available possibilities. Everyone explored tools and strategies beyond those defined in their individual learning objectives.

Several themes emerged such as the value of having time and permission to 'play' within a supportive environment and dynamic learning community. Participants created personal online learning environments (a term unknown to most). They used a wide range of tools, most of which they had never tried before, and which few had confidence in using at the beginning of the project.

Changes to Participants' Digital Information Literacy Skills

On entry to the project participants' self reported digital information literacy skills (measured as part of the DIL score) varied in comparison to their traditional literacy skills. For example, 32% of participants rated themselves as having a higher level of skill in using traditional methods when accessing and applying information. In comparison, 14% rated their level of skill using digital technologies as higher, and 55% regarded their skills for both traditional and digital approaches as the same.

At the conclusion of the project, when asked again to rate their use of digital versus traditional information skills to locate, retrieve, analyse and apply information relevant to their study and work, participants rated themselves more highly on both traditional and digital skills. There was likewise an increase in both the use of a range of digital information tools and strategies, e.g., computer conferencing, information sharing sites, online library databases etc., and confidence in using them to locate, retrieve, analyse and apply information. Self-efficacy in the use of ICT tools and methods for each participant was not measured separately; instead it was integrated within the overall DIL score.

Increase in Participants' Digital Information Literacy Scores

When overall digital information literacy scores were examined for individuals at each institution, 95% gained a higher level of digital information literacy by participating in the project. This finding is noteworthy and indicative that the model used in the project was successful. As would be expected, participants' overall confidence with computer-based and Internet-based communication and information methods across all institutions changed from a mean score of 3.3 to 4.0. The score for overall confidence was one aspect of self-efficacy. However, in a previous research project (Hegarty et al, 2005) scores of overall confidence were similar to the overall score of self-efficacy which was calculated from five categories of measures for self-efficacy:

- Personal feelings;
- Use of ICT methods;
- Confidence learning new technologies;
- Personal characteristics; and
- Overall confidence.

Therefore, participants' belief and confidence in their own abilities in using ICT (self-efficacy) did increase as a result of their participation in the research project.

Discussion of Key Findings

The findings under each of the four research questions are discussed in turn to highlight the main themes which emerged in the case studies.

1. Strategies and tools - access and interpretation of digital information

Under research question one, the way in which staff and students accessed, and interpreted digital information to create their own understandings was investigated. This involved both the use of purpose built online information literacy (OIL) modules which were customisable. The OIL modules were a resource developed specifically to support information literacy and provided a good starting point for the exploration of digital information literacy in this research. Additionally, the research investigated the use of Web 2.0 strategies and tools for organising a digital personal learning environment (PLE) or presence in a networked environment.

According to Wikipedia, "the term Web 2.0 is commonly associated with web applications that facilitate interactive information sharing, interoperability, user-centred design, and collaboration on the World Wide Web" (Wikipedia, 2010 - http://en.wikipedia.org/wiki/Web_2.0). As such, Web 2.0 strategies and technologies were regarded as integral to the investigation of digital information literacy in line with current trends in the educational sector.

1.1. Indicators of digital information literacy

As indicated in the definition of digital information literacy, several factors related to digital information, as well as a person's characteristics was found to influence the development of digital information literacy. These were detected in varying degrees by measuring the DIL scores of participants, and analysis of the focus group interviews and the qualitative material participants produced while taking part in the research. For example, by the end of the research the majority of participants had enhanced skills for accessing digital information as well as increased levels of confidence in using information technologies, and in the management of digital information. The dispositions required to obtain an adequate or minimum level of digital information literacy were found to include:

- Confidence and belief in own ability (self-efficacy);
- A demonstration of openness;
- The ability to problem solve and take risks;
- Technical capability;
- A willingness to collaborate and share; and
- The desire to keep 'up to date' driven by the changing contexts of information use and requirements.

In the Web 2.0 environment, sharing and collaboration are philosophically distinguishable attributes. For example, sharing is a term which describes a willingness to distribute resources, and support others, and collaborating implies working together in a networked community.

1.2 Supported exposure to a range of digital tools

The importance of support cannot be underestimated. This research has shown progress was made by individuals as a result of them being given the chance to explore a wide range of digital tools and their applications collaboratively in a supportive environment where it was 'safe' to make mistakes. Starting points varied in terms of both confidence and the range of digital tools with which participants were familiar. However, by the end of the research project, there was a general shift towards using a

greater range of tools. Participants demonstrated increased familiarity with technical vocabulary and a greater degree of confidence. Changes primarily occurred in the use of Web 2.0 tools new to the participants, for example, blogs, web feeds, social bookmarking, file sharing, web conferencing and photo sharing. Social bookmarking is a term to describe the way in which "bookmarks of web resources" are shared, organized, searched, and managed by Internet users (Wikipedia, 2010 - http://en.wikipedia.org/wiki/Social_bookmarking).

1.3 The Importance of the face to face environment in Digital Information Literacy

The face to face environment had a strong role to play in participants, in this research project, gaining confidence in accessing and using information in the digital environment. It became clear that in the face to face workshops, (a regular time which could be set aside) the participants were able to collaboratively enhance their digital information skills by engaging in technical conversations about materials and tools. This helped those participants in particular who were struggling to make their own understandings of the digital environment. The goals which participants set for themselves on entry into the project progressed as a result of the group interactions centred on areas of interest to themselves and the rest of the group. It would be interesting to further investigate whether it was primarily the blended format of the groups which accommodated DIL development, or the regular time allocation, or a combination of both factors, and this is an important area for research in the future. The issue of time is outlined further on.

1.4 Supported play

It is evident from the findings in this project that supported 'play' in a safe environment enabled and created new opportunities. When participants were assisted to explore and to experiment with applying their skills to real world contexts in which they were operating, they gained further skills in accessing and interpreting digital information. Through 'play' participants were permitted to make mistakes, indulge in trial and error, and to repeat the action until it was mastered while working in a low risk context. The project allowed participants to blur the boundary between work and play. Through their play they formed networks of knowledge from their experiences and interactions with a knowledge community, that is, their peers as an important source of information. Play appeared to be an important aspect of building an understanding of the digital world, giving participants the courage to explore and experiment as long as support was on hand. It was the supportive nature of the workshops and the sharing and collaborative philosophy of the model used in the research which enabled support to be provided by both facilitators and peers.

1.5 Support for different kinds of learning

All participants were encouraged to set goals for their learning from day one of the project. However, more often than not these changed over the course of the project. Partly the narrowness of their knowledge base on entering the project was responsible because they didn't know what they didn't know and so restricted their goals as a result. Also, when participants entered the research project, many had low self-efficacy with regard to digital information, and tended to blame themselves for poor technological capability. As the project progressed, however, and their confidence and persistence was fostered, their attitude changed and they adopted a more problem- solving approach. It was also observed that the nature of the exploratory and interactive environment in which they were immersed extended their learning through regular exposure to the activities and knowledge of the rest of the group.

Additionally, all group members collectively engaged in reflection at various points in the project, examining their expectations, assumptions and perspectives in the workshops. They also reflected on an individual basis using action research cycles - planning, monitoring, learning, evaluating - by writing in their blogs which were shared with the group, in journals, via email, in the workshops, and in

individual sessions with the group researcher. This all contributed to their learning process. Consequently the researchers were required to support a range of approaches for the different participants regardless of where they began on the continuum of Digital Information Literacy. For example, some participants needed individual attention, some sought the expertise of the researcher and others in the group, some accessed outside networks, and some worked together in the workshops to explore digital technologies or services under the guidance of the researcher.

1.6 Fostering a range of communication techniques

Participation in the face to face workshops gave group members the chance to engage in technical conversations about materials and tools as they struggled to make their own understandings of the digital domain. Through sharing their experiences, participants extended their technical vocabulary not only in the workshops but also through the use of blogs, email groups and the social networking sites they encountered during the project. The researchers had intended to engage participants in an inter-institutional communication network, but the time spent on within- group interactions meant that the participants' time was fully committed. The researchers observed a high level of trust within each group, and noted the strength of having institutionally based learning communities for developing capability in the digital environment. Participants tended to use the form of communication which suited their starting level of digital literacy but often were encouraged to expand into less familiar, more public forms as well. Changes in the way they communicated online, necessitated the development of a digital identity, and this was challenging for some participants as explained further on.

1.7 Becoming comfortable with a digital identity

Comfort with acquiring a digital identity was another area where change was observed over the course of the project. Initially, participants differed markedly in their confidence levels in terms of both accessing and adding to digital information on the web. They were concerned about developing a web-based digital identity and about the privacy of their information. However, when they were supported while in the experimenting phase participants became increasingly comfortable with sharing material in the public domain. For example, the use of blogs for communicating ideas and information was taken up by most participants as they became more confident and more willing to share their progress and thoughts. Thus it was observed that familiarity gave confidence, as did a growing knowledge of the possible risks and expected consequences involved in the use of Web 2.0 tools. With this came a greater awareness of copyright possibilities, ethical issues and etiquette when communicating in the digital domain, as well as the creation and utilisation of material once these aspects were explored with the help of the researchers.

1.8 The importance of easy access

The level of access to digital resources and information varied at each institution, and this became apparent during the course of this project. Where access to the open Internet was restricted in the workplace, participants' development of digital skills was affected. This occurred because they were limited in their ability to practise the new skills they acquired during the workshops. It was also apparent that institutional infrastructure (such as bandwidth) and the technical support mechanisms available (e.g. from an IT Helpdesk) impacted on the level of access and comfort that the participants experienced.

If digital information literacy is to be fostered successfully, and the outcomes of the government's Digital Strategy (Ministry of Economic Development, 2008) – connectivity, capability, confidence and increased digital content - are to be achieved within tertiary institutions, then access has to be as easy and painless as possible, for both staff and students.

1.9 The role of the customisable Online Information Literacy (OIL) modules

Staff and students were shown OIL modules (created previously for a Ministry of Education eCDF project – http://oil.otago.ac.nz) in the project workshops and they made some use of the modules either individually or with their classes during their teaching. In the main, however, it was the student participants who reported an increase in confidence and ability as a result of completing a number of modules. However some access issues did arise in the use of the modules. For example, embedded video content was not permitted by some institutional firewalls, and some of the interactive Flash animations were not accessible.

No customisation of the OIL modules took place during the project. Although the exploration of ready made modules, such as the OIL modules, specifically about the topic of information literacy was one of many approaches used by participants, their primary interest was to work on issues associated with digital information which had personal relevance to them. Participants were more interested in the practicalities of accessing and using a broad range of actual digital information for authentic purposes, rather than spending all their time exploring information topics, such as how to search for information, evaluate information etc., and in any case they developed those skills while actively accessing and managing digital information. The OIL modules are a very useful resource for using in combination with a range of other strategies, and provide foundation knowledge in the area as well as practical skills for increasing information literacy including digital contexts.

2. Personal online learning environments and the social networked community

For research question two, the researchers attempted to ascertain how personal online learning environments (PLE) and membership in a social networked community could influence digital information literacy. The development of PLEs and engagement in learning communities within each group was examined and is described under two headings: how participants set up or extended their PLEs and networks in the project, and the development of learning communities within each group.

2.1 How participants set up or extended their PLEs and networks in the project

The intention in the project was to assist participants to develop sufficient digital skills to be able to create individual electronic learning environments, as both a way to organize and keep track of what they were learning during the project. These environments would also assist participants to explore Web 2.0 possibilities for tools and networking with others. This objective was based on the definitions of a Personal Learning Environment (PLE) discussed in the literature review (Atwell, 2006; Lubensky, 2006), where a full description of PLEs and their use is described. Acknowledgment was also given to non-digital aspects of such a system (Anderson, 2009; Martin, 2007; Sims, 2007). Most of the participants in the research were informed about PLEs at the start of the project, but were not overly aware that they were developing a PLE, or that they even had one, until this was pointed out in the focus group interviews. This lack of awareness about PLEs was regarded as common and therein lays the strength of PLEs according to Clark (2007).

In this project, the researchers wanted to observe how participants developed their digital information skills as they organised a variety of digital technologies and information without specifically directing them to build a PLE in a formal or structured sense. When the concept was explained at the end of the project, they understood what they had been doing. The exploratory nature of the project acted as an enabler for participants not only to expand existing PLEs, but also encouraged them to construct PLEs of various kinds; PLEs with personal and professional relevance. The formation of PLEs,

particularly in a virtual context was found to be beneficial for the majority of participants. This finding is supported by previous research by Schaffert and Hilzensauer (2008), and seven important factors they found associated with the use of PLEs, were similar to those observed by researchers in this project. For example through the use of PLEs:

- Learners became more active and self-directed because they were involved in creating their own content;
- Input and support from peers helped learners to personalise their knowledge;
- Learning material was (potentially) limitless;
- There was more choice;
- Opportunities for social learning were present;
- Participants had more ownership of resources;
- Learning became more self-directed and organised as the project progressed; and
- Exposure to a range of technologies and social software tools enabled participants to aggregate a range of information sources in one place.

Nevertheless, what the research findings cannot confirm is the extent to which PLEs or social networking increased participants' digital information literacy as demonstrated through an increase in their DIL scores. This aspect however, is illustrated in the individual case studies (Chapter Five). There is also discussion of some of the cases within the context of PLEs in Chapter Six.

2.2. The development of learning communities within each group

The creation of a dynamic learning community was critical in the development of participants' capability. The researchers are convinced about the significance of the interactions which participants in each group experienced as a result of taking part in the action research. The majority of participants certainly engaged in an exchange of information and knowledge with others in the workshops and online within their groups, and in some cases in the global community. In accordance with the definition of a social network used to describe social systems (Garton, Haythornthwaite & Wellman, 2006), participation in the research project had an influence in building a community of learners who engaged in peer discussion and supported each others' learning.

Additionally, the interactions which participants were observed in, whether online or face to face, equated to knowledge sharing, regarded as an outcome of social networking as well as a critical element in building organisational capacity (Lamoureux, 2006). Several factors promoted engagement in digital information environments for all participants:

- The relatively unstructured, yet supportive nature of the workshops;
- The facilitation provided by the researchers; and
- The support of peers.

This all stimulated capacity for digital information regardless of participants' starting skill level. When the definition of social networking was extended to include face-to-face interaction, as put forward by Anderson (2009), it was acknowledged that the research participants did form a social networked community at each institution. Each group was a dynamic learning community and demonstrated all the characteristics associated with such an entity, such as:

- Autonomy and responding to decentralised control.
- Commitment and willingness to create and share knowledge; and
- Engagement in flexible and negotiated learning activities.

Additionally, individuals interacted through dialogue and collaboration on shared goals and problems within a project which had a common focus and incentive to collaborate (Wilson & Ryder, 1996). Finally, even though most participants found the process challenging, the majority also found the

experience worthwhile and motivating. They all left the project equipped with new digital skills and knowledge as well as strategies for learning about technology, albeit at varying levels of advancement. The majority of participants had also discovered a new network of contacts on which some felt they could call for assistance outside the project.

2.3 Goal-setting and Self-Directed Learning

Therefore, participation in a process of action research, through the active pursuit of individualised goals for developing skills in digital information, was clearly influential in increasing digital information literacy scores for the majority of participants. This process was used as a way of encouraging participants to take control of their learning and become more aware of themselves as learners. The action learning cycle was a strategy which encouraged metacognition, that is, it enabled participants to both monitor and reflect on their learning process. All groups reported improvements in technical skills, confidence and motivation in managing digital information. Additionally, participation in a group expanded participants' understanding of the possibilities available, and everyone explored tools and strategies beyond those defined in their individual learning objectives. Additionally, some advanced users with DIL scores which did not change to any degree, left the project with enhanced capability, and this was ascertained through the development of the individual case studies.

For example, Sandra came into the project with a high level of confidence and frequent use of a range of digital tools. She openly outlined her progress in the project on a blog, and interacted online with other participants in her group. Sandra's main goals were to become more proficient at accessing new technologies and information and also in managing information; she certainly achieved these goals. She was an engaged participant, who recognized her information needs, and was able to work in a self-directed, reflective and inquiring way towards finding solutions. She was also aware of the need to be more efficient in using information. Other dispositions which Sandra demonstrated emerged from the way she would 'play' with a range of tools until she found what she needed - logic, persistence and motivation. Sandra's overall DIL score decreased slightly, however her increase in knowledge and her change in attitude towards more flexibility and innovation were very evident.

It was evident by the end of the research that it was not possible for participants to develop finite digital information literacy skills in dynamic technological environments. Rather they needed to be equipped with more confidence and strategies for dealing with unfamiliar territory and new challenges; a pre-requisite for lifelong learning.

3. Digital information literacy for lifelong learning

When investigating research question three, answers about the importance of digital information literacy for the lifelong learning of staff and students (including Māori and Pasifika), productivity and innovation were sought. The participants definitely left the project better equipped to deal with technological challenges, and more motivated to utilise a wider and more diverse range of tools and strategies for life long learning. The discussion is summarised under the following headings: productivity and innovation; changing the approach to learning; attitude shifts, the need for time and future proofing.

3.1 Productivity and innovation

The results of the research demonstrate that even a relatively short and intensive period (with the right conditions) over which to develop digital information literacy was able to produce large changes to participants' digital information behaviour and the skills they used for tasks. Higher levels of digital information literacy were associated with both qualitative and quantitative changes to work patterns.

Qualitative changes were the most evident as people identified creative uses of new digital tools to enhance their work. In this case, an educational setting where change manifested itself as the creation of more diverse and digitally enhanced learning environments for their students, or enhancing their students' digital information literacy skills. For example, when teachers and librarians improved their own digital information literacy, they felt empowered to meet their students on a more 'level playing field' (in a technological context). They therefore felt better equipped to work with the students on improving their (the students') information literacy skills, particularly their critical, evaluative and searching skills.

Quantitative changes were apparent when existing work problems were identified, and practical digital solutions were found that improved efficiency and effectiveness in their everyday responsibilities. Participants changed their work patterns in a variety of ways from developing new skills such as effective search strategies, using new tools to organize work or materials, to developing more efficient problem-solving approaches. Although, participation in the study provided two hours per week in which people were able to leave behind work and study commitments and focus on developing their digital information literacy, this was not enough time and participants spent many additional hours exploring or practising on their own. Nevertheless, the strong feeling of time pressure was ever present, because developing new skills and embedding them in work behaviour takes time. Therefore, the danger of not providing adequate time in the workplace for this endeavour was that the time spent on initial learning of digital information literacy would be wasted.

3.2 Changing the approach to learning

As mentioned previously under research questions one and two, support for different ways of learning and the setting up of personal learning environments and social networking was critical for the development of digital information skills and capability. All participants realized that their old methods of learning were not appropriate for dealing with digital information, and they engaged in risk-taking, collaborative group learning and play, as well as using a wider range of learning strategies. For example, trial and error learning was previously regarded by participants as too time wasting and frustrating. However, participants came to value this approach in the context of developing new digital information skills. The group environment was important to the use of this strategy as others were on hand as a safety net if things went wrong. A major advantage of the strategy was the increase in confidence experienced from successful mastery.

3.3 Attitude shifts

Most participants in the study felt that they had experienced a shift in attitude. Many started from a position of feeling negative about technology; some were so fearful they had physiological reactions when confronted with it, others were proud of their technophobia. In time, participants came to view digital information skills as essential to being literate in the 21st century and even a source of enjoyment. Underlying this shift in attitude was a growth in confidence, motivation and persistence - aspects of self-efficacy - and a resulting greater belief in their abilities to take on new challenges.

3.4 The need for time

Most participants felt they didn't have enough time to 'play', and some felt guilty about 'wasting time' doing this, yet recognised that nurturing new skills takes time. Recognising the importance of developing these skills and balancing that against the urgent demands of work or home was on ongoing issue for most people. Although, participation in the research provided dedicated time to explore digital information sources and strategies for managing them, justifying the time needed for practice away from the workshops was harder.

3.5 Future proofing

Most participants recognised that the value of their new skills was in the way they prepared them for the future. A common metaphor used by participants, described the project as the start of a lifelong journey. Others viewed their digital information literacy as a seed that needed to be nurtured. Many characterized their new literacy as personal growth that they expected to continue well into their retirement. Others felt that the experience had opened new worlds to them, describing how they were becoming more fluent in a language that enabled them to interact in different ways with new people, or even in different ways with people they already knew.

There was much evidence to suggest that digital information literacy was very important for lifelong learning of participants in the study as part of being a productive and innovative member of society. Unfortunately, due to the small numbers of participants who identified as Maori and Pasifika, no definitive conclusions could be made for them, or for ethnic-related preferences for developing digital information literacy. Also given the limited range of ethnicity, gender and age of participants it was not possible to draw any conclusions as to the wider applicability of this project across other ages, gender and cultures. However, the approach used in the project is sufficiently robust to warrant its use in a wide range of contexts and tertiary environments.

4. The New Zealand academic workplace and other OECD countries

Research question four was formulated to determine the standard of digital information literacy in the New Zealand academic workplace compared with other OECD countries.

This research study could not determine the overall standard of digital information literacy in the New Zealand working age population. However, it has described findings from a small number of purposeful cases from across a small subset of NZ tertiary institutions.

This combined with the variety of digital tools and environments, and the highly contextualised way in which participants in this study engaged with these tools means there is little opportunity to make predictions from our findings. It is possible, however, due to the robust nature of the research, for others to develop an understanding of the model in use, and anticipate the outcomes of its use within a particular context.

This problem of ICT use being highly contextualised was addressed in the OECD Programme for the International Assessment of Adult Competencies PIACC initiative. With regard to the ICT component, the emphasis of PIAAC was on the cognitive processes underlying literacy, such as dealing with dynamic and interactive problems as well as non-linear information structures, rather than on aspects of the use of specific information technologies. Indeed, an in-depth assessment of technology aspects would be difficult to undertake given the high context specificity in which technologies are utilised. (Schleicher, 2008)

The findings from this research, used in conjunction with other sources, if and when they become available, (note - the PIACC data is no longer going to be available), is needed to provide a resource for planners and policy-makers who are looking to improve the ability of New Zealand adults to understand the potential of technology and make informed choices about when, and how best to use it.

Conclusions

The overarching message from this research is that capability, rather than a standardised literacy, is key to success in dynamic technological environments. This capability integrates strategies for learning, and takes into account particular dispositions for handling digital information and change in digital environments. The data gathered from staff and students in four different tertiary organisations, using a mixed methods approach, provided a broad and diverse body of evidence for the use of flexible and individualised methods to support the development of digital information literacy in the tertiary sector. The robustness of the research findings makes the outcomes generalisable because others can easily interpret them and apply the model in different contexts and situations.

The research findings confirmed that Digital Information Literacy (DIL) is an evolving concept. In this research, the definition of DIL did not assume an linear approach to seeking and finding information, as its precursors did, but in contrast and most importantly, it incorporated both the skills needed for accessing and using digital information, and integrated them with the dispositions needed to be successful in this endeavour.

The survey instruments used for this research are a first attempt at measuring change in the level of digital information skill, and indicated there were positive shifts for almost all participants. The changes in digital information skills were underpinned and increased by shifts in attitude towards the use of digital technologies and strategies. This led to a growth in confidence, motivation and persistence - aspects of self-efficacy - and a resulting greater belief in their abilities to take on new challenges. The case studies which were developed from the whole range of available data yielded rich material. A number of key aspects emerged which can be used to inform future programmes for developing DIL capability in tertiary staff and students. These aspects are included in the recommendations for the project.

This research has shown there is no one size fits all model. Instead users of digital information are more likely to increase their level of skill and capability if supported to work within an environment which they have created for themselves. In this research project, flexible programmes and strategies were used and they were successful in enabling learners to set their own goals based on personal and professional relevance.

Most of the outcomes anticipated for the research project have been met. For example, a definition of digital information literacy has been developed and is regarded by the researchers as a starting point for further discussion with others in the tertiary sector. Whether the definition is appropriate for Australasia is yet to be determined and once the findings of the research are disseminated, further discussion can continue about this. The inclusion of digital information literacy standards in the ANZIIL framework is probably not necessary, but findings from this project may influence a change in this area.

The dissemination and active use, including customisation, of existing online information resources such as the OIL modules was not definitive in this project, nevertheless, they can be part of the digital toolbox of strategies for digital information development. Strong evidence for using Web 2.0 strategies and technologies to enhance key digital information literacy competencies was found.

It was not possible to fully determine the importance of digital information literacy for lifelong learning in New Zealand, though there were signs that some inroads were achieved in this area. Lastly, it was not possible to rate the digital information literacy of New Zealanders within the OECD due to a lack of

measures for DIL in the OECD. Nonetheless, findings from this project can be used to provide a baseline for developing such measures for future research.

Several recommendations for achieving optimal digital information literacy skills and strategies for lifelong learning have resulted, as well as a model of social networking which facilitates a high level of digital information literacy relevant to tertiary environments. The recommendations are outlined below.

Summary of Key findings

1. Participants rated themselves more highly on several aspects of digital information literacy at the conclusion of the project, and demonstrated an increase in:

- Both traditional and digital information skills;
- The range of digital information tools and strategies used, e.g., computer conferencing, information sharing sites, online library databases etc.;
- Confidence in using tools and strategies to locate, retrieve, analyse and apply information;
- Digital information literacy (DIL) scores (95% of participants);
- Overall confidence with using ICT methods (mean score changed from 3.3 to 4.0).
- Belief and confidence in their own abilities in using ICT (self-efficacy) ;
- Aspects of capability associated with DIL (as indicated by the list of dispositions).

2. The dispositions required to obtain an adequate or minimum level of digital information literacy were found to include:

- Confidence and belief in own ability (self-efficacy);
- A demonstration of openness;
- The ability to problem solve and take risks;
- Technical capability;
- A willingness to collaborate and share; and
- The desire to keep 'up to date' driven by the changing contexts of information use and requirements.

3. Working collaboratively in a supportive environment as part of a learning community, to explore a wide range of digital tools and their applications, enabled progress in DIL.

4. Dedicated time and supported 'play' (provided by facilitators and peers) with a range of ICT tools in the workplace and for study, and permission to continue the endeavour outside formal workshops was essential for developing digital information literacy.

5. Action learning, and the setting of individualised goals for developing skills in digital information, was influential in increasing DIL scores for the majority of participants.

6. Large changes to participants' digital information behaviour and the skills they used for tasks occurred as a result of a relatively short and intensive period of professional development (with the right conditions).

7. A shift in attitude was demonstrated by the majority of participants and this included growth in confidence, motivation and persistence - aspects of self-efficacy - and a resulting greater belief in their abilities to take on new challenges.

8. The overarching message from this research is that capability, rather than a standardised literacy, is key to success in dynamic technological environments.

Recommendations

There are four main recommendations arising from this research. It is recommended that:

1. Learning programmes intended to develop digital information literacy in tertiary education settings must:

    - Have personal relevance for individuals and be integrated into everyday, work and study contexts;

    - Allow learners the opportunity to 'play' and engage in supported exploration, as well as exposing them to new tools and strategies for organising a digital PLE or presence in a networked environment (Web 2.0);

    - Recognise the importance of allocating time for regular face-to-face, (or possibly where appropriate, synchronous online) small group, learning opportunities that provide support for diverse self-directed goals and flexible and collaborative approaches to learning;

    - Facilitate participation in dynamic learning communities to encourage sharing and collaboration regarding digital information resources and knowledge;

    - Encourage meta-cognitive awareness of the learning process, through reflective practice and peer communication;

    - Provide support to allow learners to become comfortable with a digital identity and become familiar with ethical behaviour and etiquette in the digital networked environment; and

    - Consider the dimensions of digital information literacy, and foster personal capabilities, conducive to success in an ever changing digital environment, as outlined in the definition of DIL developed for the project. (The actual dispositions and skills required are described fully in the project taxonomies, Chapter Three & Appendix 2).

2. Infrastructure at tertiary education institutions should be continually reviewed, in order to capitalise on the benefits of consistent access for staff and students to the latest web technologies, while recognising the ongoing need for security.

3. Educators and information services personnel should continue to engage in discussion and debate with the intention of reviewing and redeveloping a definition of DIL, based on the work done in this project, to underpin future programmes for developing and maintaining the digital information skills and capability of staff and students.

4. Further research is undertaken to clarify some of the key findings and gaps in this project – as outlined in the Conclusions chapter.

Chapter One: Introduction to the Project

1 Overview

The New Zealand Ministry of Education in its request for proposals for the 2007/2008 round of Tertiary eLearning Research Fund highlighted the need to focus on information literacy capability in New Zealand. The focus of this project was to gather empirical evidence in an exploration of the digital information literacy capability of tertiary students and staff, and the impact of this on lifelong learning, productivity and innovation in the NZ context.

The researchers in the application for funding aimed to investigate aspects of digital information literacy within the following parameters proposed by the MoE:

1. How does information literacy manifest itself differently in the knowledge society, as envisioned by the New Zealand Digital Strategy (Ministry of Economic Development, 2005)?
2. How is information literacy expressed in the New Zealand education competency frameworks? For example, the Ministry of Education (2005) proposes the following key competencies in tertiary education:

    - Operating in social groups;
    - Acting autonomously;
    - Using tools interactively;
    - Thinking.

3. How, and to what extent, does information literacy appear to be essential for success in employment, including its contribution to productivity and innovation in the workplace in the knowledge society?
4. How, and to what extent, is information literacy fundamental to success in lifelong learning in the knowledge society?
5. What is the standard of information literacy among the New Zealand working-age population compared with other OECD countries?

The project was led by Otago Polytechnic and completed in collaboration with research partners at Manukau Institute of Technology, Massey University and the University of Otago. The project builds on early funded research undertaken for the Tertiary eLearning Research Fund as well as studies undertaken by staff of Otago Polytechnic (Penman, 2007; Keen, Ritson-Jones, Coburn, Hegarty & McDonald (2006); Hegarty, Penman, Brown, Coburn, Gower, Kelly & Moore (2005) & Blackall, 2005). This project uses an action research method and has been designed to gather data to meet specific goals, objectives and outcomes which are listed further on.

Outcomes

The project outcomes were to be:

a) A definition of digital information literacy for Australasia and inclusion of digital information literacy standards in the ANZIIL framework;

b) Recommendations for achieving optimal digital information literacy skills and strategies for lifelong learning;

c) A model of social networking which facilitates a high level of digital information literacy relevant to tertiary environments in readying graduates for the workplace;

d) Dissemination and active use, including customisation, of existing online information resources and Web 2.0 strategies for enhancing key digital information literacy competencies;

e) An indication of the importance of digital information literacy for lifelong learning in New Zealand.

f) An overview of the rating of the digital information literacy of New Zealanders within the OECD.

1.1 Why the project was needed

In the current environment in which digital information is becoming essential to almost every aspect of modern life, there is a need as never before, for capable learners and teachers who are digitally information literate. Tertiary students require digital information literacy and a degree of skill with computers and the Internet for many aspects of study at tertiary level - enrolment, access to and use of course materials, preparing assignments, checking final exam marks, communicating with teachers. According to the Digital Strategy (Ministry of Economic Development, 2008) there is an urgent need for key players in a digital future, learners and teachers. This phenomenon was eloquently stated by Marshall (2006): "Critically, capability includes the ability of an institution to sustain e-learning delivery and the support of learning and teaching as demand grows and staff change" (p.7).

The need for digital information literacy skills which match changes in the educational sector in recent years and enable lifelong learning are now paramount for success in a digital, knowledge society. Tertiary graduates with digital information capability are essential players in the workforce in a knowledge society. There were plenty of definitions of information literacy but very few which included digital aspects. There was also very little information available about the best way to develop digital information literacy in academic contexts in New Zealand.

Current definitions of digital information literacy

Digital information literacy is regarded as one aspect of information literacy which is very relevant for the 21st Century (WikiEducator, 2007), particularly where there the focus is on the creation of a Knowledge Society (Ministry of Economic Development, 2008). According to Hon David Cunliffe (Ministry of Economic Development, 2005), there was still "some way to go to create a Knowledge Society which not only has instantaneous and available connections to diverse, high quality, content, but there must be users with the capability and confidence to use it [Technology] to fully enrich their lives" (p.1).

A definition for Digital Information Fluency was used as a starting point in the project. DIF involves "knowing how digital information is different from print information; having the skills to use specialized tools for finding digital information; and developing the dispositions needed in the digital information environment" (Illinois Mathematics and Science Academy, 2007).

Other definitions for information literacy were also taken into account. According to the American Library Association (2006), information literacy is the ability to locate, evaluate and effectively use information. Specifically the Australian and New Zealand Institute for Information Literacy (ANZILL) suggests a framework for information literacy based on the principles of independent learning, personal fulfilment, using information for decision making, and lifelong learning which 'underpins information acquisition, understanding and application' (Bundy, 2004), all skills essential for tertiary

students to develop for the many aspects of study which includes everything from online enrolment through to accessing and using course materials, drawing on resources to preparing assignments, checking final exam marks, and communicating with their peers and lecturers.

The research questions were developed so that a working definition of digital information literacy could be developed for New Zealand contexts, and which could also be relevant to Australia.

1.2 Research Questions

From the areas for investigation identified in the call for proposals and in the NZ Digital Strategy four research questions were framed and these are explored in detail in this report:

1. Investigate how staff and students access, and interpret digital information creating their own understandings, using purpose built modules which are customisable and/or Web 2.0 strategies.

2. Ascertain how personal online learning environments and membership in a social networked community can influence digital information literacy.

3. Indicate how important digital information literacy is for lifelong learning of staff and students (including Māori and Pasifika), productivity and innovation.

4. Determine the standard of digital information literacy in the New Zealand academic workplace compared with other OECD countries.

1.3 Phases of the project

The literature review was the starting point for the project, and in particular a definition of Digital Information Literacy was sought along with the existing standards and the range of measures of information literacy which were in use internationally. The intention and one of the primary outcomes for the project was to develop a definition of Digital Information Literacy for Australasia.

The methodology for investigating the four research questions involved a mix of qualitative and quantitative methods framed within an action research approach. The main vehicle for the research was an extended series of workshops in which study volunteers could explore a range of digital tools and digital information strategies to meet their particular work or study needs. The workshops were run at each of the partner institutions.

The report outlines the results of the study and includes summarised pre and post workshop series survey data, in addition to thick descriptions of the qualitative data gathered during the workshops. Detailed case studies are provided from each of the participating institutions as well as an overall case-study for the project as a whole.

We conclude with a discussion of our findings and recommendations.

Chapter Two: Literature Review

2 Introduction

This review comprises an introduction and four sections based on the Digital Information Literacy (DIL) project research objectives and strategies. Underpinning these sections is an explanation of the approach required for the review and discussion relating to an evolving digital information literacy definition. In Section one, ideas supporting the instruments used to survey the practices of staff and students in relation to digital information are addressed. There is reference to the use of the OIL (online information literacy) modules and to the impact and potential of Web 2.0 technologies. In Section two, there is an examination of the nature of personal online learning environments, and the ways that membership of social networked communities can influence digital information literacy. Section three includes literature relating to lifelong learning and references to Maori and Pasifika. In the final section there is a focus on New Zealand digital information literacy standards and consideration of available material from other OECD countries.

Prior to sections one through four, there are sections about information sources, background information and discussion around finding a suitable definition for digital information literacy.

2.1 Information sources

When conducting a literature review pertinent to the topic of digital information literacy it was soon apparent that traditional methods and sources were often unsuitable as they were often out of date with current trends and technologies. Seeking publications from respected sources cited in academic contexts such as books and journals, introduced the problem of a time lag which was inconsistent with the dynamic nature of the study. Digital technologies and particularly Web 2.0 possibilities and practices (already being superseded) have been evolving and changing so rapidly that the normal time wait for peer review and publication quickly outdated the literature needed to support this research study, although it does retain some residual relevance. Therefore the researchers needed to turn to digital material, developing sometimes concurrently with the study, which, although peer reviewed online, may not always have been subjected to more formal and traditional means of scrutiny. Wikipedia, for example, contains extensive material on digital information literacy, but we know that its validity may be questioned by some. The traditional editorial barrier between author and reader has been removed in this open format, and replaced with a much more informal arrangement producing contestable outcomes. Overall the dynamic nature of the field means that more than usual reliance was placed on Internet sources which along with conference proceedings are often the only way of obtaining really up to date material.

2.2 Background

As noted by a number of authors, information is a key factor in the 21st century, with many describing this era of history as the Information Age (Ulner, 2007; Pink, 2005). Information surrounds the individual and is available not only in text, but in static and moving images and audio formats. Increasingly individuals are required to manage large amounts of information, if they are to make informed decisions and to construct new knowledge. The knowledge, skills and attitudes required are collectively known as information literacy, or where the information is made available through electronic means, digital information literacy (Darrow & MacDonald, 2004). Personal computing, the Internet and electronic communications are transforming how we work, live and learn, and introduced both the need for as well as new opportunities for learning (Garrison & Anderson, 2003). The New Zealand government predicts a future where not only the web and computers will be connected, but also “other critical infrastructure such as buildings, transport systems and the energy grid” (Ministry of Economic Development (2008, p8). The new digital age will transform all areas of society, and

connectivity for all New Zealanders in a global context through “new and emerging digital technologies available to New Zealanders, is critical to our ability to succeed in this transformative future” (Ministry of Economic Development (2008, p8). Numerous definitions for information literacy appear in the literature, and mostly they embody overlapping concepts. Definitions for digital information literacy are not so common.

The term information literacy was first coined in 1974 by Zurkowski, an American educator (Bundy 2004), with initiatives in schools occurring in the 1970s in Australia and in the 1980s in New Zealand (Bundy 2004). Thus the concept of information literacy is relatively new for the New Zealand population. Information literacy is often defined in terms of what an information literate person can do. For example, Doyle (1992)(cited in Andretta 2006, p. 15) states that an information-literate person is able to:

> Recognise the need for information; appreciate the importance of accurate and complete information to make intelligent decisions; identify potential sources of information; develop appropriate search strategies to access sources of information irrespective of technology; evaluate information and organise this for practical purposes, and, lastly, integrate information into an existing body of knowledge.

This definition suggests that a linear process of problem-solving occurs with the individual not only recognising the need for, but being able to search for, evaluate and organise the information found, and incorporating this into their existing knowledge base.

This linear process is further expanded in the ANZIL standards which not only includes recognising the need for, accessing, evaluating, storing and incorporating information, but also suggest that the information literate person is able to use the information to create new knowledge or solve problems, and that they also know how to use information wisely and ethically for the betterment of not only themselves, but others. (Bundy, 2004) For the purposes of this research project, examination of approaches to information literacy was a starting point. Widely accepted definitions in addition to those from ANZIIL (The Australian and New Zealand Institute for Information Literacy) come from the American Library Association and the United Kingdom SCONUL (Society of College, National and University Libraries) Seven Pillars model (Appendix 1).

2.3 Digital information literacy definition

In developing a digital information literacy definition we needed to consider whether it was subsumed under the broad information literacy umbrella, or whether it should contain elements which were not represented there. This exploration led to consideration of a wide range of associated terms none of which seemed to be totally synonymous with digital information literacy. Our method of doing this deserves mention because it used tools and methods which have only recently become available via Web 2.0 technologies. According to Wikipedia, “the term Web 2.0 is commonly associated with web applications that facilitate interactive information sharing, interoperability, user-centred design, and collaboration on the World Wide Web” (Wikipedia, 2010 - http://en.wikipedia.org/wiki/Web_2.0). As such, Web 2.0 strategies and technologies were regarded as integral to the process of investigation of digital information literacy in line with current trends in the educational sector. The project team chose to use Wikieducator as a forum for themselves and, hopefully, for other interested people. Within this context they presented and shared ideas which gave broad coverage to the problem of defining digital information literacy. An insight into this process is available through viewing pages and links at: http://wikieducator.org/DIL/Development_of_DIL_definition_(DoDD)

Some pertinent considerations drawn from those online sources are mentioned here. Computer literacy has been defined as:

> An understanding of computer characteristics, capabilities and applications, as well as the ability to implement this knowledge in the skilful and productive use of computer applications suitable to the individual roles in society (Simonson et al., 1987, p. 232).

This definition is inadequate to cover the burgeoning range of digital possibilities. It also places the computer at the heart of the definition and does not highlight personal behaviour, issues and ethical considerations inherent in digital information practices. The Council of Europe in 2009 launched the third edition of twenty-five fact sheets relating to the concept of “Internet literacy” which is considered to be vitally important. The supporting rationale claims that in the space of only a decade or so, the Internet has revolutionised the way we work, learn and play. Traditional literacy skills are no longer sufficient for those who wish to take advantage of the opportunities and avoid the pitfalls presented by the Internet. Indeed, the lack of basic information literacy skills is as much a factor of the so-called digital divide as the lack of material technology and skills needed to access the Internet and electronic sources.

The Internet and the various forms of networking it facilitates are important aspects of digital information literacy, but again this definition needs expansion to include digital and electronic technologies and possibilities that are Internet independent. Another aspect worthy of attention in this rationale is the notion of a *digital divide*, sometimes associated with a gap between people who are called digital natives (Prensky, 2001), and older people who did not grow up with these technologies (digital immigrants), or people who live in circumstances where they lack access or experience with digital technologies. An assumption that digital immigrants lack information literacy skills as much as access to the technologies can be contested as it is not always correct; this was discovered by a needs analysis conducted for the online information literacy (OIL) modules project (Hegarty, Coburn & Darling, 2005). It is suggested that familiarity with digital technologies can only be equated with information literacy if a narrow definition is accepted, one which is lacking elements of critical literacy which may be unlikely to be displayed by new or cautious digital practitioners. While the terms *digital native* and *digital immigrant* have been widely adopted it is worth noting that there have been strong critiques of this view and its lack of a scholarly basis (McKenzie, 2007; Owen 2004).

21st century literacy and *multimedia literacy*, both extending beyond the digital domain, are other terms which overlap but do not totally coincide with digital information literacy. For example,

> 21st century literacy is the set of abilities and skills where aural, visual and digital literacy overlap. These include the ability to understand the power of images and sounds, to recognize and use that power, to manipulate and transform digital media, to distribute them pervasively, and to easily adapt them to new forms. (New Media Consortium, 2005, p2.)

Multimedia literacy could be included in this definition due to the use of images, sounds and animation. Before attempting a definition of digital information literacy for New Zealand, today, we also need to address Gilster's work outlined by Pool (1997) which led the way towards recognition of *digital* as a new facet of literacy. Here the definition is limited by the technology available at the time but it embodies a critical concept which could be extended beyond the information to the way we use the digital tools that enable us to process information.

The concept of literacy goes beyond simply being able to read; it has always meant the ability to read with meaning and to understand. It is the fundamental act of cognition. It also includes being able to think critically about the information being read (Eisenberg, Lowe & Spitzer, 2004). Digital literacy likewise extends the boundaries of definition. It is cognition of what you see on the computer screen when you use the networked medium. As stated by Pool (1997):

> ...acquiring digital literacy for Internet use involves mastering a set of core competencies. the most essential of these is the ability to make informed judgements about what you find on-line, for unlike conventional media, much of the net is unfiltered by editors and open to

> contributions by all. This act of critical thinking governs how you use what you ind on-line...." (p. 2).

If we choose to borrow a definition the one described as *digital information fluency* provides a good basis.

> Digital Information Fluency (DIF) is the ability to find, evaluate and use digital information effectively, efficiently and ethically. DIF involves knowing how digital information is different from print information; having the skills to use specialized tools for finding digital information; and developing the dispositions needed in the digital information environment. (DIF, 2009)

However, it does not seem essential to try and capture this new concept in a single sentence or a short paragraph. It may be more helpful to look at some of the key ideas it encompasses which are drawn from a wide range of sources (Martin & Maddigan, 2006). Expanding on the above definition it would seem desirable to ensure that the concept of *lifelong learning* generally stated or implied in literacy definitions, is included. It needs to embody knowledge of the digital environment and capability, a broader notion than skills or competency and extending to capability, as well as dispositions, attitudes and/or beliefs which support self-efficacy and critical reflection, hence empowering a person to function effectively in a dynamic digital domain (Phelps, 2002).

For New Zealand purposes it was considered necessary to start from the accepted ANZIIL standards (Bundy 2004), to examine these in terms of other widely accepted standards including those from Britain and the United States (ALA[1], SCONUL), then to consider what are the new elements which are associated with emphasis on the digital aspect of information literacy. These elements include new tools and products (Belisle, 2006) which enable information to be accessed, processed and synthesised in ways previously impossible, new responsibilities arising from dealing with intellectual property with varying degrees of openness, new information sources and strategies, such as blogs, wikis and networked forums (Web 2.0), open to a world wide audience, and new means of creating and disseminating information in multimedia formats.

In the following sections, evidence to support each of the four research objectives is presented.

2.4 Section One

Research Question One: Investigate how staff and students access, and interpret digital information creating their own understandings, using purpose built modules which are customisable and/or Web 2.0 strategies.

In addressing this objective it was necessary to develop strategies, construct and administer surveys, and facilitate the development of a project that included methodologies and approaches consistent with action research. Relevant literature links to implementation. It refers to previous projects using similar tools and related contexts, approaches to case study and action research, and learning in a Web 2.0 environment.

Prior projects

Contributing to the Digital Information Literacy (DIL) project are three prior projects: Phelp's (2002) thesis which maps the complexity of computer learning; Hegarty et al.'s (2005) study of elearning adoption and academic staff self-efficacy in six New Zealand educational institutions, and Coburn et al.'s (2006) evaluation of online customisable modules.

[1] American Library Association

Phelp's (2002) recognised that in order to foster student capabilities amidst rapid technological change, teachers needed to make changes in their own practices and attitudes. She considered that:

> Effective computer education for teachers required more than skills training. It involves changes in attitudes, values and beliefs that provide confidence for ongoing learning. Furthermore, it involves learning to adapt to change, to be flexible, intuitive and above all persistent. It requires the fostering of teachers who know how to be self directed and independent in their computer learning, rather than those dependent on structured routines or guidelines (p. ii).

The qualities listed above and others detailed in the thesis form the core of the capability characteristics used to analyse the observed and self reported behaviour of the project participants (Appendix 2). Phelps (2002) also places considerable importance on attribution theory (Martinko, 1995) which deals with individual's explanations and perceived causes of occurrences. This can influence performance and behaviour in digital environments along with "help seeking, motivation and goal setting"(Phelps, 2002, p. ii). The latter three are incorporated into our analytical instruments.

A final key aspect emerging from Phelp's (2002) thesis is that of "self-efficacy". This concept was used by the lead researchers Hegarty, Penman, Brown, Coburn, Gower, Kelly, Sherson, Suddaby & Moore (2005) to guide their research relating to academic staff members in tertiary institutions. Four of the five dimensions of self-efficacy they examined have been deemed appropriate, with modification, for the DIL project. These are:

personal efficacy using digital tools and methods, confidence using specific tools, personal characteristics when moving into a new digital situation, and overall confidence with digital tools and methods. Those elements are incorporated into Section 2 of the pre and post-surveys.

An intention of the DIL project was to enable further evaluation and use of the customisable OIL modules (Coburn, Keen, Ritson-Jones, Hegarty & McDonald, 2006) which were designed to foster information literacy via digital means. This intention sat alongside the DIL project approach supporting individual goal setting to cater for the diversity of participants; students and staff, digitally experienced and inexperienced. Therefore the uptake of the modules had to be left to individual preference and perceived need.

Action research

Action research including the integral reflective component was the cornerstone of Phelp's (2002) work and this has also influenced the DIL project methodology. The complexity of this is best explained through the concept of first order and second order action researchers (Capobianco & Feldman, 2006). Project participants in this study were the first order researchers. They joined with the intention of developing their digital information literacy within contexts of their own choosing. Their blogs and other means of reflecting, as well as their practices and outcomes provided research data. At another level are the project facilitators. These second order researchers facilitated the workshops which set up the first order research, reflected on their own practices and through interpretation and analysis of the first and second order data will compile overall findings.

The use of action research in an educational setting where improvement in workplace skills is a desired outcome was very appropriate for this study, because the action research cycles could evolve to suit the needs of the participants, and the direction they wished to take (Trentham & Cockburn (2005). Also the process moves progressively through a series of stages as problems are solved (Riel, 2007).

The process presented to participants was based on Coleman and Lumby's (1999) action learning spiral diagram (see Figure 1) which features planning, action, monitoring, evaluation, and review as

one moves on into a second cycle. As this was the process, the researchers were encouraging the participants' to engage in as they developed their digital information skills.

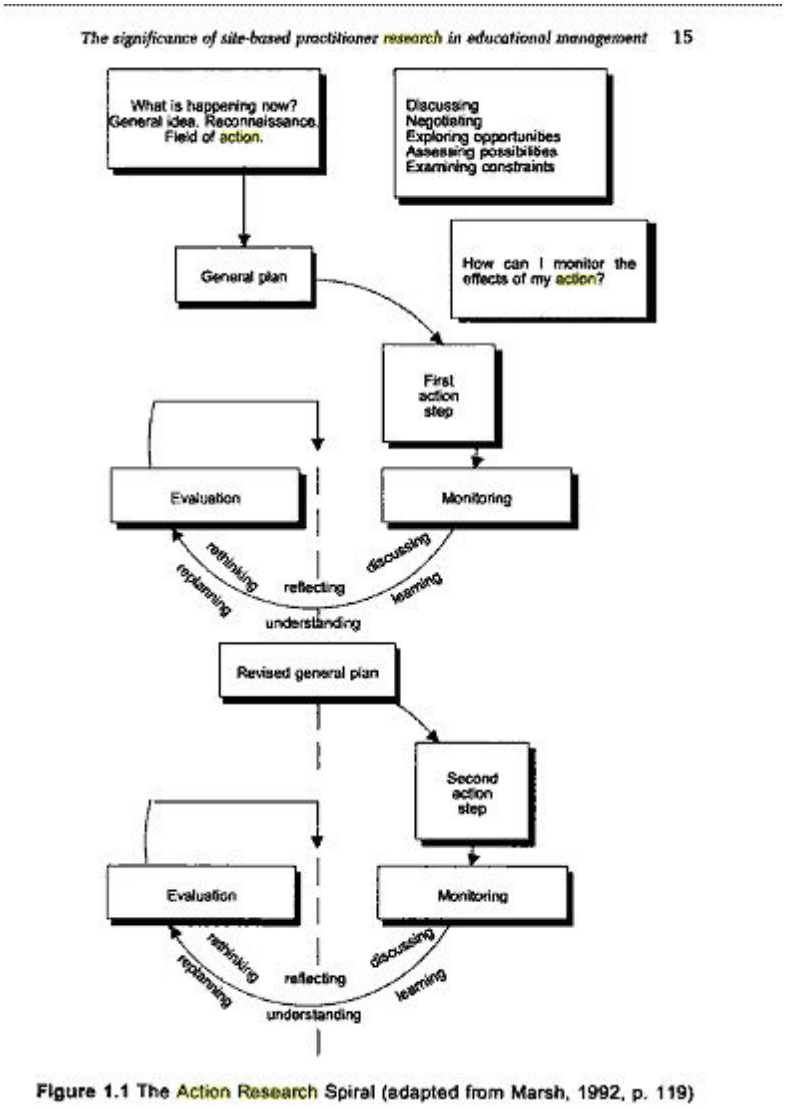


Figure 1: Action research spiral (Coleman and Lumby, 1999).

Case Studies

Action research as described above yielded data about all the project participants. While the pre-surveys and post surveys provided quantitative data, a method of analysing and interpreting all the qualitative participant data, was required. From the literature it is apparent that a collective case study (Merriam, 1998; Stake, 1995) approach was suitable. While there was strong awareness of the dangers of making general statements based on small non-representative samples, it was also considered valuable to build up rich pictures of each participant drawn from multiple sources (triangulation). These compilations were examined for common features, or major differences (themes and patterns), which could enlighten our views regarding the development of digital information literacy. Patton's work (2002) mentions the feasibility of using a systematic framework for handling case studies across multiple sites.

> ...if a national or state program consists of several project sites, the analysis may consist of three layers of case studies: individual participant case studies at project sites combined to

> make up project site case studies, project site case studies combined to make up state program case studies, and state programs combined to make up a national program case study (p. 447).

In the context of this project, individual participant cases studies were constructed first. These were combined to create a case study for each of the four institutions and all drawn together to present an overall project case study. Case study as a research process rather than a method of research was introduced into the analysis phase of the project due to the need to find answers to “how” and “why” questions about the participants and the groups of participants (Yin, 2009).

A deductive approach to analysis was undertaken whereby external frameworks or taxonomies were utilised to guide analysis and interpretation of themes, patterns and categories (Patton, 2002). Hence two taxonomies: digital information literacy and capability were used (Appendix 2). The DIL categories describing contexts for participant learning are largely based on the ANZIIL information Literacy standards (Bundy, 2004) modified with reference to SCONUL (1999), the Seven Pillars model, ALA (2000) guidelines for higher education and the Digital Information Fluency (2009) model, including its questions and descriptors (Appendices 1 and 2). It is accepted that the core processes participants engaged with can come under the broad information literacy umbrella, but that the nature of this engagement will differ significantly from traditional to digital contexts. For capability, as referred to previously, the key words are strongly influenced by Phelp’s (2002) descriptors, but again modified in the capability taxonomy to cater for more diverse digital contexts (Appendix 2).

Participants and self-efficacy

Based on social cognitive theory (Pajares, 2002; Bandura, 1986) self-efficacy can be expected to have a strong bearing on participants' ability to access and interpret digital information and create their own understandings. Perceived self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Self-efficacy beliefs determine how people feel, think, motivate themselves and behave. Such beliefs produce these diverse effects through four major processes. They include cognitive, motivational, affective and selection processes (Bandura 1994, p71).

It is possible to consider participant's behaviour and perceived success according to four sources of their self-efficacy beliefs: mastery, vicarious experience, social persuasion and their physical and emotional states (Bandura, 1994). If a shift in self-efficacy is to occur then it would be expected that the project would offer support enabling mastery in new fields, that modelling from facilitators, or other group members would make new capabilities seem possible, that group members and outsiders would encourage changes in behaviour and practices, and that negative physical and/or emotional responses would be reduced, or removed. People might also choose to engage with situations that they previously avoided and be motivated to persist or to undertake new challenges. For example, working in collaborative situations to explore and share knowledge with a group of fellow travellers (Panitz, 2005).

The framework used to structure the case studies also draws on Bandura's (1987) social cognitive theory. His reciprocal triad of personal, environmental and behavioral factors provided guidance for identifying and barriers to changes, or absence of change, in knowledge, skills and attitudes.

The work done by Renata Phelps (2002) in the area of computer learning provides fertile ground for measures of self-efficacy. She draws heavily on complexity theory as a way to explain the multifarious approaches to developing capability in computing (Phelps, Hase & Ellis, 2005; Phelps, 2002). Additionally, the relationship between a person’s attitude to technology and the motivation to learn when faced with challenging situations is all inter-related and strongly associated with self-efficacy –

belief in one's abilities (Phelps & Graham, 2008; Piper & Austin, 2004; Phelps, 2002; de Montigny, Cloutier, Ouellet, Courville & Rondeau, 2001; Milbraith & Kinzie, 2000)

2.5 Section Two

Research Question Two: Ascertain how personal online learning environments and membership in a social networked community can influence digital information literacy.

For the purposes of this research, it was anticipated that participants would develop web-based personal learning environments and interact online in a social networked community.

In this section the nature and range of personal online learning environments and a definition of social networked communities is explored and the influence they might have on digital information literacy is considered.

For this section traditional literature has little to offer as it is not up to date. Sources important to this project were individuals undertaking current research and teaching in this field, a conference attended by some course participants, and the vast amount of information available on the Internet in general and specifically through membership of social networked communities.

It is first necessary to offer suggested definitions of the key terms personal online learning environments and social networked communities.

Personal online learning Environments

The word online is not present in most discussions about personal learning environments, although integral to it, hence the abbreviation PLE. From several definitions offered through Wikibooks, Lubensky (2006) has been selected as a starting point.

> …a Personal Learning Environment is a facility for an individual to access, aggregate, configure and manipulate digital artefacts of their ongoing learning experiences (para 2.)

He explains how the PLE gives control to the learner and differs from the pre-existing, management controlled, virtual learning environments (VLEs) and Learning Management Systems (LMSs) common in academic institutions. How a PLE differs from an e-Portfolio, assembled usually for the purposes of "reflection, assessment or self promotion" (Lubensky, para 6) is also outlined, with the PLE not only assembling static material but set up to facilitate ongoing interaction and linking. The capacity of a PLE to enable users to organise the learning materials, and through tagging and other means to make them readily available, is of prime importance. While it may be a repository linking to a range of Web 2.0 networks and applications, it can also tie into other more formalised entities such as VLEs and required e-Portfolios. Whereas, several writers have defined PLEs, and given examples of theirs (Martin, 2007; Sims, 2007), Johnson, Liber, Wilson, Milligan, Beauvoir & Sharples (2006) have been reluctant to stipulate a definition, stating that it was an emerging theme which was still under debate. In other words a definition was reliant on the purpose for, the concept of and the philosophy underpinning personal learning environments. Also several writers have suggested definitions for the personal learning environment there is no consensus about whether it should include non-digital aspects. Johnson et al, (2006) outlined three themes associated with the discourse around personal learning environments:

1. a critique of current learning technology;
2. explanatory frameworks for social and technological change within which the PLE is situated;

3. advocacy for the transformation of technology, institutions and pedagogy through the PLE (p. 77).

Earlier in the debate, Downes (2004) had referred to something similar to a PLE but called it "…a personal learning center, where content is reused and remixed according to the student's own needs and interests. It becomes, indeed, not a single application, but a collection of interoperating applications—an environment rather than a system." (p. 5).

Also Anderson (2006) describes the PLE as: " …a unique interface into the owner's digital environment" integrating a range of learning - personal, professional, formal and informal - through the use of "a series of syndicated and distributed feeds, and including both portfolio and profile systems for housing and sharing content and expertise (para 3). He also describes the "PLE as a social as well as an information environment, connecting the user to individuals and cooperative events and activities throughout the Net", which links the PLE concept closely to social networking, something Anderson, 2009 has recently redefined to include non-digital interaction.

While there has been debate about whether PLEs are confined to digital artifacts (Karrer, 2007), more lately there is evidence to support the idea that a PLE is much more than a software application, and is a method for utilizing technologies in the learning process (Attwell, 2006). Certainly there are educational bloggers who have been inclusive of non-digital methods when describing their personal learning environments. For example, Michele Martin (2007) describes am multitude of methods for gathering and processing information and organising her learning. She uses an eclectic range of web-based tools,e.g. Feedraider, Ning, Google, del.icio.us, technorati, LinkedIn, blogging, listservs, Skype, GoogleChat, Wikispaces, Diigo, a Tumblr microblog, a bookmarklet in her Firefox Toolbar, bubbl.us and she also includes Amazon.com in her PLE. She also uses non-digital methods and states: "I have several hard copy journals … and I have them in several sizes, including a tiny one that I keep in my purse for when random ideas or connections occur" (para 16). Another educationalist, Sims (2007) has an even greater variety of non-digital methods included in his PLE such as hard-copy journals, meditation, yoga. The following diagram illustrates the PLE.

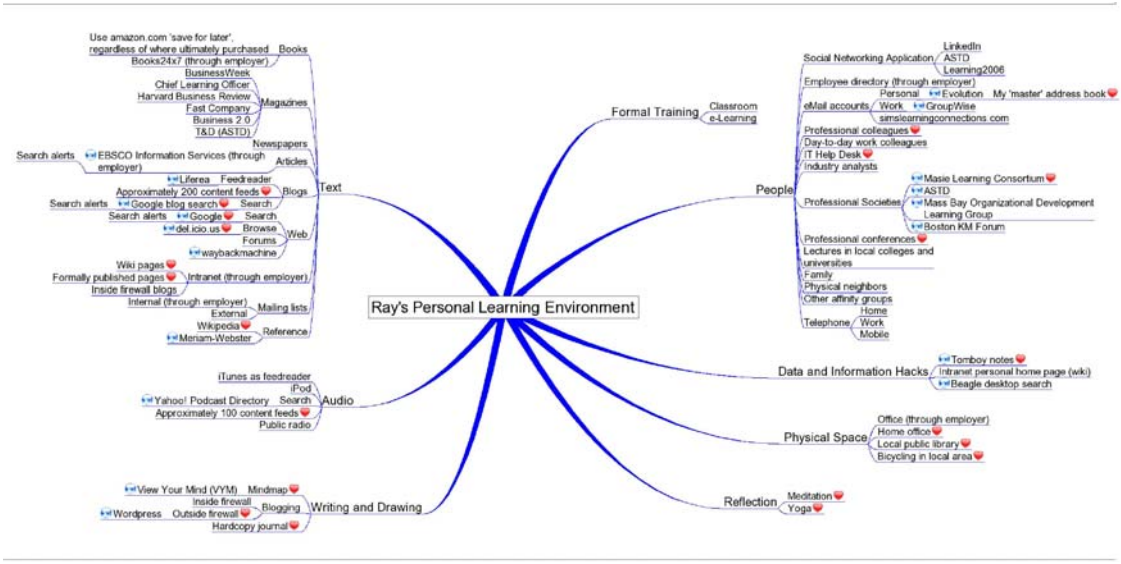


Figure 2: Ray Sim's Personal learning Environment (full size available at:http://simslearningconnections.com/ple/ray_ple.html)

Additionally, the dilemma about whether to include non-digital aspects of information and learning within a PLE is overshadowed by some of the arguments around defining what constitutes a PLE. Blackall (2005) claimed that the concept of a PLE was extraneous, particularly when organisations

were trying to re-create them as applications similar to the VLE or LMS where they could be used like a template from the desktop. He said, “Why do we need a PLE when we already have the Internet? The Internet is my PLE, ePortfolio, VLE what ever. Thanks to Blogger, Bloglines, Flickr, Delicious, Wikispaces, Ourmedia, Creative Commons, and what ever comes next in this new Internet age. I have a strong online ID and very extensive and personalised learning environment. Actually I think the PLE idea is better envisioned by the futurist concept known as the Evolving Personalised Information Construct (EPIC).” (para 4.) Clark (2007) was in favour of using a PLE model because it was more accessible as opposed to hiding material in a VLE (Virtual learning Environment) or LMS which was passworded. Anderson (2006) in contrast was concerned that the complexity and range of Internet tools which might comprise a PLE were “nowhere near as easy to use to facilitate and support many of the educational functions that are trivial in modern LMS systems” (para 16). He believed that the LMS should be retained but saw the PLE as more future-proof in the long term unless the LMS evolved to become more learner centric. More recently, Anderson (2009) describes a pedagogical model for distance education.

> …based on connectivist ideals which contains elements of a virtual and personalised learning environment quite removed from the LMS concept. This model with its use of Web 2.0 tools continues to allow for self-paced programming but works to allow students to create and enhance connections – with other learners, with content, with learning networks and with machines. (para 6.)

This model of a PLE certainly has an aspect of social networking incorporated, and connectivity is certainly a theme previously mentioned by others. For example, Jeremy Hiebert (2006) developed a comprehensive diagram to illustrate the components of a PLE in which a range of self-directed learning tools were pivotal for “collecting, reflecting, connecting and publishing” (para 1). He had initially named the concept as an ePortfolio but preferred the term personal learning environment.

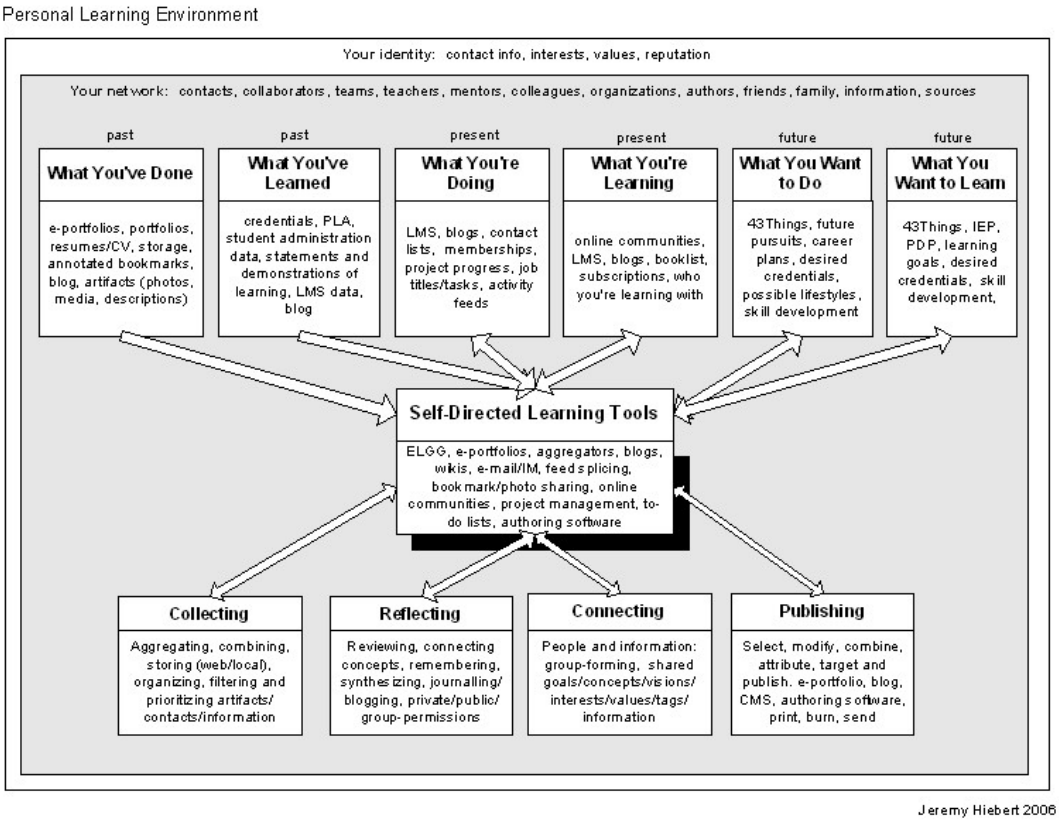


Figure 3: Diagram of the concept of a Personal learning environment (Hiebert, 2006).

Hiebert (2006) claimed that the PLE unlike an ePortfolio, had more potential for extending networks and he also re-iterated the self-directed nature of the concept. He said: "…each person's personal learning environment should be their own unique combination of tools, networks and methods that help them accomplish their goals. If the learning environment is truly personal, the tools and the learning are self-directed by definition." (Hiebert, 2006, para 5.)

From another perspective Shepherd (2007) includes not only non-digital aspects in his PLE but also his non-online networks, "My personalised learning environment includes many aspects of my knowledge network, including my browser favourites, my RSS feeds, my electronic documents and so on. But it's also non-digital and not easily captured in my browser. It includes my wife, friends and work colleagues, my tennis coach, my books, magazines and newspapers, the TV I watch, the films I see, the radio programmes that I listen to. I know it would be neater if these were all digitised and processed for my easy access, but I'm not so sure I don't prefer them as they are." (para 3.)

Initially, the project team was not sure whether or not to include non-digital aspects of a personal system for organising material, e.g. hand written journals. Also if non-digital methods are acceptable as part of a PLE, then face-to-face interactions within a social networking situation such as the research groups also needs to be considered a possible influence on the digital choices and comfort levels of the participants.

Social Networking

Social networking as a term for the digital environment has developed in recent years to encompass the use of "…networked tools that allow people to meet, interact and share ideas, artefacts and interests with each other" (Anderson, 2009). Previously online networking was regarded as the premise for informal learning, socialising and sharing information. A number of websites and applications are dedicated to supporting the phenomenon, and enabling communities of learners to gather online, e.g. MySpace, Facebook, Second Life, Open Sim, LinkedIn. Also a multitude of sites have sprung up which support open sharing of information and networking based on the resources which are hosted on them, for example, Flickr for photo-sharing, Youtube and Blip.tv for video-sharing, social bookmarking sites, e.g., Delicious, wikis, and a huge range of others.

Increasingly social networking applications are being used more formally in learning not only online and distance but also in face-to-face and blended modes. As a result, Terry Anderson has altered his definition of social networking to become: "Networked tools that support and encourage learning through face-to-face and online interactions while retaining individual control over time, space, presence, activity and identity" (Anderson, 2009, para 1).

Stephen Downes (2006) refers to a social network as: "…a set of distributed and interlinked entities, usually people, as represented by websites or pages - constitutes a type of distributed representation (p. 5).

A definition for a social network service illustrates how the concept of an online community is interlinked with social networking.

> A social network service focuses on building online communities of people who share interests and/or activities, or who are interested in exploring the interests and activities of others. Most social network services are web based and provide a variety of ways for users to interact, such as e-mail and instant messaging services. (Wikipedia, 2009.)

Although social networking describes the large scale services such as MySpace, Facebook, Youtube and Flickr enabling people to share information in the form of ideas, photos, music videos etc., friends and colleagues, the term also includes what is referred to as “bounded networks such as elgg” which tend to be for more restricted interest groups and professional communities (Anderson, 2009, paragraph). The main types of social networking services are those which contain directories of some categories (such as former classmates), means by which to connect with friends (usually with self-description pages), and recommender systems linked to trust (Wikipedia, 2009.) In any case, such social networked services are set up to encourage the formation of communities.

Essential features associated with many of the networked sites and tools, were their free and open nature, which made it easy for non experts to establish, manage and participate in online interaction and thus encouraged collaborative output. They are networks, they do have social components and for this project the term social networking was extended to include platforms such as WikiEducator, Wikipedia, Wikiversity, blogs, small scale wikis - for example set up for a class or group, Google documents and Google Groups and email forums, online conferencing tools and social bookmarking sites, as well as forums using old style list servers which operate for vast numbers of specialist topics. The use of such tools can lead to the development of groups or communities.

Less likely to be considered under the heading of social networked communities are large and small scale online communities, open or closed, which may have a stronger focus on information sharing, rather than social contact. These communities can be of strong relevance in academic circles, our target group for the research project. The term learning community has been extended by Wilson & Ryder (1996) to the concept of Dynamic Learning Communities (DLCs) which they describe as groups of people who form a learning community generally characterized by the following:

- distributed control;
- commitment to the generation and sharing of new knowledge;
- flexible and negotiated learning activities;
- autonomous community members;
- high levels of dialogue, interaction, and collaboration;
- a shared goal, problem, or project that brings a common focus and incentive to work together (Wilson & Ryder, 1996, p. 2).

The differences between learning communities, dynamic learning communities, online or virtual communities and communities of practice are interesting and will be touched on in the Discussion chapter.

Risk and responsibility

Ethics was a problematic aspect of DIL because of differing values and attitudes towards intellectual property and changing views on the acceptability of information sources and methods of dissemination. In the traditional academic environment there are clear guidelines about copyright and plagiarism, sometimes breached, but nevertheless entrenched in law and institutional policies and practices. With the arrival of Web 2.0 technologies, the ability of the Internet to allow immediate connection with trustworthy and both reliable and unreliable information, the capacity for self publication and a drive from some respected people for openness, sharing and collaboration in non commercial environments, confusion abounds. Questions arose about what protection could be given to intellectual property, whose words and images could be used and for what purposes, and what were the consequences, long and short term of opening oneself to the online world. Making informed

judgements about these matters had to be an integral part of DIL, but the dilemma remained about which information could be trusted to provide appropriate guidance.

Understanding the consequences of engaging in online interactions has two components. There are the reasonable and expected consequences which derive from the way services are provided, the statements made on sites and an appreciation of how you can choose to protect, or not protect your input. Then there are the risks associated with illegal online actions which can range from nuisance to extensive criminal activity. Internet users also adopt fake persona which may be for fun, for privacy – similar to when people published under pseudonyms, or to deceive or harm others. Knowing about these risks is also necessary, but if we abandon trust and opt for total protection we may stifle many of the opportunities inherent in this new world of global communication. This area of risk and responsibility is now becoming a field for research such as that conducted by Fogel and Nemad (2009). The abstract to their journal article contains an outline of some of their findings:

> Individuals with profiles on social networking websites have greater risk taking attitudes than those who do not; greater risk taking attitudes exist among men than women. Facebook has a greater sense of trust than MySpace. General privacy concerns and identity information disclosure concerns are of greater concern to women than men. Greater percentages of men than women display their phone numbers and home addresses on social networking websites. Social networking websites should inform potential users that risk taking and privacy concerns are potentially relevant and important concerns before individuals sign-up and create social networking websites.

The question to be asked is how information from such research will find its way into the public domain and be of value to the academic, or ordinary social network user. It is most likely that what will become known to the public are the sensational instances such as the recent story of a German woman duped by a Dunedin man, met on the Internet, which led to an “armed offenders callout” (Otago Daily Times, 2009, p. 1).

The prevalence of social networking and trends towards openness and transformation of attitudes towards digital information literacy in the educational sector can be illustrated by a report about the International Conference on Computer mediated Social Networking in the following section.

International Conference on Computer mediated Social Networking

From an academic perspective the International Conference on Computer Mediated Social Networking (Green, 2008) held in Dunedin in June 2008 was challenging and of high interest. It brought together a wide range of interested people from many countries, included the presentation of 22 papers, offered three panel discussions and attempted to foster interaction through running Twitter during sessions. Those with wireless laptop links could feed in their comments and ask questions which appeared on the large screen to one side of the stage. Aspects touched on above such as identity issues in virtual communities fuelled panel discussions. Other paper presentations relevant to DIL covered social bookmarking, designing online communities, critiques of Second Life, integration with traditional information systems, social networks and mobile phones, comparisons between online and face to face network structures. It is of interest that this conference face-to-face, that the participants opted for a further face-to-face conference and that although arrangements were made to have the material placed online to encourage feedback, less than a year later, this material does not appear to be available on the Internet. Further pertinent points were highlighted by one of the keynote speakers; David Green from Monash University, Australia who questions intentionality in a digital context.

> We humans think we are smart; we think that we plan and act rationally. But in many ways we are like ants; busy doing everyday things, oblivious of the bigger picture, of the large scale

> effects that emerge from our activity. In the same way that ants create an ant hill without knowing what they are doing, so too humans create social trends and patterns without being aware of it. The rapid growth of communications and information technology has only accelerated this tendency. Every new technology has side effects, usually unintended and information technology is no exception. The computer is a kind of serendipity machine, making possible all kinds of new discoveries in science but at the same time changing society in unexpected ways. (Green, 2008, p. 8.)

This has implications for the development of personal digital information skills and capability, and also for those who seek to facilitate this development.

2.6 Section Three: Lifelong learning

Research Question Three: Indicate how important digital information literacy is for lifelong learning of staff and students (including Māori and Pasifika), productivity and innovation.

In recent years with digital information permeating recreational, business and educational aspects of peoples' lives, the desire, and in many cases the need, for an altered form of information literacy has become apparent. This has instigated moves towards linking ICT developments, and the related people behaviours and capabilities, with economic success and cultural change. It is widely recognised that the dynamic nature of the digital environment requires an effective participant in society to engage in ongoing learning, rather than just achieving qualifications and developing capabilities which will stand them in good stead for the rest of their lives (Ministry of Economic Development).

In this section some literature relating to digital information literacy and its connection with life long learning is surveyed. Our search has been for material which will point towards future directions for working with and supporting people to function effectively, productively and creatively in increasingly digital environments. It complements the researchers' knowledge gained from the data gathered, plus their engagement in the project and interactions with project participants. The material also informs interpretation and analysis.

Given that DIL is a sub set of IL it is relevant to return to IL statements and definitions. One of the most influential was the report prepared by the American Library Association 1989. It places a strong emphasis on lifelong learning. Firstly it states that, "To promote economic independence and quality of existence, there is a lifelong need for being informed and up-to-date" (ALA, 1989, para 2). This is expanded on through linking lifelong learning with the concept of "learning to learn" which engages much attention from educationalists.

> Ultimately, information literate people are those who have learned how to learn. They know how to learn because they know how knowledge is organized, how to find information and how to use information in such a way that others can learn from them. They are people prepared for lifelong learning, because they can always find the information needed for any task or decision at hand (ALA, 1989, para 3).

Many years later those key ideas about lifelong learning were still considered appropriate by New Zealand libraries as illustrated by the University of Otago statement from its strategic goals for (2003 - 2006):

> Information literacy is not only a set of skills but also the astuteness that comes with experience in finding, evaluating and using information. This is the most obvious link with lifelong learning: that we continually learn from experience. The teaching and learning challenge for the Library is therefore twofold: to make the experience of finding information valuable both for the immediate need and for the future (University of Otago, 2003, p. 2).

One of the challenges for the future is recognition of IL, and in particular DIL, as not being the sole domain of librarians, rather this key attribute needs to be embedded in everyday activities. In this respect the Internet availability of such a vast storehouse of information shifts the focus to places not bounded by physical location and traditional library approaches. This is being recognised with the National Digital Heritage Archive, a claimed world leader being established in New Zealand (National Library of New Zealand). But there would seem to be a need for DIL support to come from a much wider field, and not just be left in the hands of library experts; likewise with lifelong learning. This concept affects everyone, but Kearns (2005) claims it is poorly understood.

> The key finding from the consultations and research was that lifelong learning is poorly understood in Australia, and that this acts as a barrier to concerted partnership action by all stakeholders in progressing opportunities for learning throughout life for all Australians, in many contexts (para 10).

His subsequent explanation provides a useful summary and a relevant link to DIL through his technology reference.

> The contemporary 21st century concept of lifelong learning adopted by OECD, the European Union, World Bank, and leading OECD countries is that lifelong learning involves all forms of learning and occurs in many contexts in society. It therefore spans formal, non-formal and informal modes of learning with the home and workplace increasingly important as contexts for learning. The impact of technology is increasing the influence of informal and self-directed learning and providing new ways to extend learning opportunities. Learning to learn is the key 21st century competence. How to connect the various forms of learning in coherent strategies is a central challenge (Kearns, 2005, para 11).

That challenge is being taken up by New Zealand and other OECD countries. For example, material specifically relating to Maori and Pasifika, digital information literacy and lifelong learning is seldom found in the same package, but there are contributing sources such as those discussed in the next section. With respect to the broader, yet in a sense more limited, concept of information skills, National Education Monitoring Project (NEMP, 2006) data compares Maori with Pakeha, and Pasifika with Pakeha. From these comparisons of self reported skills and attitudes there was no significant difference between Maori and Pakeha, although there were some small and moderate differences in task achievement, while Pasifika students were much more positive in their attitudes (NEMP, 2006). The question is whether this positivity at year 8 as mentioned in the project report bodes well for the ongoing information literacy of Pasifika people.

Government actions through Digital Strategy 2.0 (Ministry of Economic Development) which have potentially high relevance for Maori and Pasifika (who in our experience have not wanted to be paired – Personal Communication) are described in the next section. For these to be successful, wide dissemination of information, plus facilitation, which enables communities to participate and obtain funding, will be of vital importance.

2.7 Section Four: New Zealand and OECD countries

Research Question Four: Determine the standard of digital information literacy in the New Zealand academic workplace compared with other OECD countries.

Given that steps are only now being planned to measure the standard of digital information literacy in countries (OECD) it is not currently possible to make valid comparisons, even if New Zealand data was available. Initiatives being undertaken in New Zealand and other OECD countries include attempts to measure levels of information literacy, which now encompass the use of ICT, and

strategies to advance capability in the wider digital field as outlined in New Zealand's Digital Strategy (Ministry of Economic Development). While there is a focus on adult digital information literacy for the Section 4 objective, so far most attempts to measure and promote DIL have come from within pre-tertiary educational sectors. For this reason reference is also made to this important precursor to tertiary education and workplace practices.

Pre-tertiary Information Literacy

The National Education Monitoring Project (NEMP) (2005) surveys of Information Skills which had the most relevance for the DIL project were undertaken in 1997, 2001 and 2005. The surveys measured student ability on a range of tasks as well as recording attitudes towards finding information. They were conducted at years 4 and 8 in 260 randomly selected schools (NEMP, 2005). The assessment categories fit broadly with IL standards previously discussed (Appendix 1). They are: clarifying information needs, finding and gathering information, and analysing and using information. Student attitudes were also surveyed. The 2005 report (NEMP) shows that the importance of digital sources has increased in 2005 with 61% (Year 4) and 88% (Year 8) choosing the Internet as the source where they usually find information. This compares with 47% and 72% respectively in 2001. As to students' actual digital capability this was less easy to discern. In a small number of tasks students were allowed to actually click on computer choices, but in other instances they were given printouts of web pages and asked questions relating to these. Web page searching does feature in the three out of the ten link tasks which will be tested again this year, but no details are available for these because it would jeopardise the validity of the retesting.

For some groups, positive attitudes towards finding information were at variance with their achievement in the tasks set. This was shown in comparisons between Pasifika students and Pakeha, and between students with English as a second language compared with those who had English as a first language. In both cases the first named groups were considerably more positive in their attitudes but had small, moderate, or large negative differences in their achievement. As some of the attitudes of interest to NEMP: curiosity, open-mindedness, discrimination (critical evaluation), confidence, self management, perseverance and satisfaction, are similar to those considered in our project, which also uses a self reporting survey technique, this merits consideration (NEMP, 2005).

New Zealand Digital Strategy and DIL

After extensive consultation, the latest New Zealand Digital Strategy 2 was released in August 2008. The capability aspect described below has the most relevance for the DIL project.

> Digital technologies are constantly changing the way we live, work and play. All New Zealanders will need new skills to participate fully in this digital world. As well as digital literacy and technical ICT skills, our education system needs to engender creativity in all students (Ministry of Economic Development, p. 36).

Although this statement applies to “all New Zealanders” when the actions are examined they appear to be quite limited. The statement below refers only to pre tertiary education:

> Ensure all students leave school digitally literate, through appropriate early childhood, primary and secondary curricula and teaching (Ministry of Economic Development, p37; Foundations for Discovery, the e-learning Action Plan for Schools and the New Zealand Curriculum, 2007).

The only other measure listed to achieve this objective of universal digital literacy is “Accelerating the roll out of the Aotearoa People's Network and an ongoing Community Partnership Fund” (Ministry of Economic Development, p37). Investigation of the Communities and Culture section of the strategy finds that the National Library has been given the responsibility to set up digital hubs for people, at libraries and marae, and to provide services and training. The Community Partnership Fund (CPF) is

intended to support community “initiatives that improve people's capability and skills to use ICT and develop digital content” (Ministry of Economic Development, p28). This fund is ongoing and so far has made contributions towards projects such as “the Clutha Agricultural Development Board’s programme of using existing ICT facilities at rural schools to run computer training courses for farmers” (New Zealand Government, 2007). While the intention in New Zealand is to develop universal digital literacy, which would overlap with digital information literacy, the stress on school programmes is contrary to notions of lifelong learning, and the community initiatives appear to lack coherence. Applications come from diverse groups for diverse purposes with some sort of ICT component. A question to be asked is how people find out about these opportunities? Our research group was unaware of them, despite extensive work in the digital information literacy and e-learning fields, until closely reading the strategy.

A further matter relevant to our project is the statement in the Monitoring and Evaluation Framework appendix to the Strategy that “...there is not currently enough useful baseline information that is directly relevant to New Zealand to confidently evaluate the effect of the Strategy on high-level outcomes “ (Ministry of Economic development, p49). This lack of baseline information highlights our difficulties in making comparisons between New Zealand and other OECD countries. Available information is out of date and at best could only be considered as a prerequisite for developing digital information literacy. The statistics for 2003 show the following:

Table 1: Statistics for computer and Internet use in New Zealand compared to OECD in 2003.

		New Zealand	**OECD average**
Computer Access	per 100 population	41.4	37.5
Websites per capita	per 1000 population	31.4	15.3
Internet subscribers	per 100 population	24.0	22.4

Compiled from Statistics New Zealand, 2009.

The likelihood of major change in subsequent years is high and it should be pointed out that while New Zealand in 2003 was a little above the OECD average, in two categories, it was “placed around the middle of the rankings on most indicators” (Statistics New Zealand , 2009).

OECD Initiatives

Steps are being taken which will make comparative data, with strong relevance for digital information literacy, available in a few years time, if New Zealand chooses to use the survey instruments being developed, and if the instruments produce datasets which have cross country validity. The OECD Programme for the International Assessment of Adult Competencies (PIAAC) seeks to measure key cognitive and workplace skills (OECD, Directorate for Education, 2009). While this is a very broad aim the components described have a strong congruence with the aspects we have described as digital information literacy. At the core of PIAAC will be an assessment of literacy in the information age, understood as the “interest, attitude and ability of individuals to appropriately use socio-cultural tools, including digital technology and communication tools, to access, manage, integrate and evaluate information, construct new knowledge, and communicate with others”. In addition, PIAAC will collect information from respondents concerning their use of key work skills in their jobs – a first for an international study (OECD, Directorate for Education, para 3).

Chapter Three: Methodology

3 Introduction

The researchers from the four institutions used a mix of qualitative and quantitative methods, within an overarching approach of action research. Pre and post surveys, face to face workshops, participant reflections from blogs, action learning cycles and journals, email correspondence and focus group interviews were used to collect data. In addition, individual and institutional case studies were created, which when combined, formed an overall case. A process of analysis and interpretation was used to integrate all forms of evidence when developing the case studies. In this chapter, an overview of the approach taken in the project with regard to the recruiting of participants, the research design, the range of collection methods used and the analysis of the data resulting from them is reported.

3.1 Recruitment

Participants for the project were recruited via posters which were circulated at the four institutions involved (Figure 4). The posters were used to invite both staff and students to participate in a Digital Information Literacy Project which offered opportunities for ten students and staff to participate in a small action research project. The explanation on the poster was:

> This project will help you identify and explore your digital information literacy needs for work or study and help you experiment with solutions. You choose what you want to do and the researchers facilitate a process to help you reach your goals. People from all areas of work and study are sought and places are limited.

Figure 4: Poster used for recruitment in the Digital Information Literacy project.

Also on the poster, there was a definition of digital information literacy and some suggestions for projects which participants might like to explore. Staff and students who expressed interest were asked to fill in a form outlining the aspect they considering and to give an indication of when they would be available to attend any workshops. A sample form can be found in Appendix 4.

It was anticipated that the recruits for the research would take part for various reasons and from a range of tertiary education areas. For example, they would be: either students seeking assisting with searching for and evaluating resources, or staff who believed that they or their students were having difficulty with digital information literacy. It was expected that staff who took part would be aware that their own knowledge was lacking and, therefore, would use the research to have their needs met, which ultimately would assist the students they taught if they were teaching staff or others with whom they worked. Participants recruited from members of staff were also anticipated to be librarians, educational development centre staff or those who provided learning support for students, as well as management staff who were aware of the issues regarding digital information literacy, but were not yet sure how to address these issues with their staff.

Successful participants were provided with an information sheet outlining their probable time commitment, the workshop process and information about privacy and other ethical considerations. Consent forms were then collected and filed. Both these forms are located in Appendix 4. At the first workshop, the design of the research project was explained to the participants and they were told about the four objectives or research questions.

3.2 The research design

Four research questions were investigated:

1. Investigate how staff and students access, and interpret digital information creating their own understandings using purpose built modules which are customisable and Web 2.0 strategies.
2. Ascertain how personal online learning environment and membership in a social networked community can influence digital information literacy.
3. Indicate how important digital information literacy is for lifelong learning of staff and students (including Maori and Pasifika), productivity and innovation.
4. Determine the standard of digital information literacy in the New Zealand academic workplace compared with other OECD countries.

The research design was action research and groups were located at each of the four participating institutions taking part in face to face workshops over a period of ten weeks. Action research creates the expectation that those involved will be researching a particular situation with the intention of taking action that will make a difference, bring about change or improvement and solve problems while engaging in ongoing learning to improve practice (Riel, 2007; Coglan & Brannick (2002). Therefore it was anticipated that the action research process to be used at each of the four institutions taking part would demonstrate changes in participants' digital information literacy. The initial strategies chosen by the researchers recognized the need for a process which empowered participants, and one which was able to integrate both flexibility and action learning into the approach.

Action research cycles

The intention was to use an approach with two or three cycles over a period of 10 to 20 weeks, depending on participants' availability. However, a 10 week action research process was settled on as this was manageable within the parameters of the project. Each participant was part of the overall action research project, and followed an individual action research cycle. Individuals who had an issue in digital information literacy were recruited. Initially, there were going to be two types of

participant, as the researchers were going to also going to take part in a participatory model of action research however this approach was discarded in favour of working with recruited participants only.

The following strategies were used in the action research cycles:

- Time was set aside for group discussion during the workshops. Participants negotiated the direction of their digital information literacy skill development on an individual basis. There were also individual consultations and interviews as required to determine the requirements and progress of participants.
- The first action research cycle commenced with each member of the group determining their own problems in relation to digital information literacy, and with the help of the researchers, they identified a range of solutions for themselves.
- The solutions involved a commitment to practical work both in the workshops and between workshops, so that over the duration of the research project, participants were developing their digital information literacy skills through using a range of resources and strategies appropriate to the individual's needs in each group.
- Participants were introduced to a range of solutions and approached for setting up their Personal Learning Environment (PLE). Resources such as:
    - Online Information Literacy modules -http://oil.otago.ac.nz/oil/index/Modules.html
    - Web 2.0 tools and strategies.
- Group discussions and interactions in the workshops helped to ascertain a holistic description of participants' digital information literacy skills and self-efficacy in eLearning. Both these factors were monitored throughout the workshops, with an online survey administered in the first and last workshops (referred to as pre-survey and post-survey) and also individual or focus group interviews conducted at the end of the final cycle to gather further detail.
- Data collected included results of the survey(s), notes and recordings made during workshop sessions between the students, staff and researchers, progress notes and reflections recorded by participants on open blogs or in private journals plus comments on blogs, and email correspondence within the groups. The ways in which information was recorded was negotiated with participants within each of the groups.
- Analysis of all the data sources along with the practical work and contributions of participant's throughout the project helped to determine whether participants made advances in their digital information literacy skills and raised their level of self-efficacy in eLearning.
- The qualitative data produced by the workshop group discussion sessions, workshop interactions, online interactions and samples of practical work helped the researchers to compile rich data for thematic and interpretative analysis, and assisted with building a holistic picture of each participant's skill level and level of self-efficacy throughout the project. Subsequently, all the available sources of data for each individual were compiled as part of a case study for each participant.
- The data collection approaches enabled researchers to examine and actively influence the ways in which students and staff accessed and applied digital information literacy skills to their learning and in their work and professional development.
- Competencies such as the ability to interact with each other in social groups, learn autonomously and use reflection to further the learning process were developed and monitored.
- It was envisaged that a digitally, networked community connected via email and blogs would be set up as part of the research, however, this ended up becoming specific to each group as opposed to across the groups.
- Researchers used Web 2.0 tools and strategies to record and reflect on research processes and procedures and to communicate with each other and the participants. This data was going to be analysed as part of the project to demonstrate how the digital information literacy

skills of the research team evolved as a result of the project. However, constraints of time and funding did not enable the analysis phase to occur.

The project researchers decided to use an action – oriented approach with a mix of qualitative and quantitative methods (Coglan & Brannick, 2002) so that meaningful data could be collected to measure the complexity of immersion in the digital environment. This was also to ensure participants could develop their digital information literacy skills while working within a supported and active learning environment. In addition, during the analysis and interpretation phase of the project, and given the diversity of the participants, it was decided that a case study approach was an appropriate way of handling the data. Yin, (2009) recommends case study when the phenomenon under study is not readily distinguishable from its context, as occurred in this instance.

Analysis and interpretation of data

Case study as an analytical technique was used very effectively to collate the material collected during the project and this was done using more than one type of unit of analysis (Yin, 2009). According to Yin (ibid), case study research as an all-encompassing method can relate to not only research design and data collection but also to the approaches used to analyse data. In this study, individuals (participants) and groups (the four institutions) comprised two types of units of analysis and the data from these were examined for the presence of consistent patterns (pattern matching) and explanations (explanation building) in relation to digital information literacy. The patterns and explanations so revealed, led to the construction of a unit of analysis which established the parameters for a single overarching case. Thus a combination of action research and case study methods were used in the research design. This approach has previously been used with some success by Halonen (2008) during the investigation of information systems; however this research was also underpinned by a theoretical framework explained in the next section.

3.3 Theoretical Framework

The research design is based on the ANZIIL standards (Bundy, 2004), the definition of Digital Information Fluency (21stCentury Information Fluency , 2009), and the research work of Renata Phelps (2002) and others (Phelps, Ellis & Hase, 2002) where they investigated the connection between metacognitive strategies and self-efficacy in learning associated with information and communication technologies (ICT) including computers. Hence the ANZIIL standards and Phelp's research findings were used to develop two taxonomies for analysing the data. The taxonomies are called the DIL Taxonomy (based on ANZIIL standards) and the Capability Taxonomy (based on Phelps, 2002). Each comprises a list of categories and descriptions of skill and application.

DIL Taxonomy

This taxonomy is based on six ANZIIL standards and these identify that the information literate person:

1. **Recognises** the need for information and determines the nature and extent of the information needed;
2. **Finds** needed information effectively and efficiently ;
3. **Critically** evaluates information and the information seeking process;
4. **Manages** information collected or generated;
5. **Applies** prior and new information to construct new concepts or create new understandings;

6. **Uses** information with understanding and acknowledges cultural, ethical, economic, legal and social issues surrounding the use of information.

For the purposes of this research, the descriptors were reworked to remove the judgement statements and instead questions were posed to allow for the interrogation of the data constructed for the individual case studies. Additional categories emerged (sharing and collaboration), during the examination of the data. The word digital was inserted into the taxonomy to retain the focus of the research. Differences between traditional information literacy and digital information literacy appeared to be twofold. Firstly new technologies for information are part of a very dynamic and openly public environment, and secondly, traditional literacies involve more stable processes, physical entities and information which was generally subjected to rigorous screening and organised in more closed formats by experts. Hence, there is now a need for individuals to explore, and keep up to date with changing technologies in the new digital information environment. Given the informal uses of many of the new digital tools, the flexibility of the virtual environments constructed and the unfiltered nature of the information available, there was also an enhanced need for people to critically appraise both the tools and the information. The enhanced framework for digital information literacy standards appears below:

Table 2: DIL Taxonomy.

Recognition	What information, digital information strategies and/or digital information tools are required or available?
Access	Where is the information located and how can it be found using digital means?
Evaluation	How reliable is the information? How effective are the digital tools and strategies?
Management	How is the information organised digitally and made available for future access or use?
Application	Using digital tools or strategies, how is the information being used, applied, communicated, or synthesised to create new understandings?
Ethics and Issues	Which ethical considerations and digital information issues are recognised and/or acted on.

This taxonomy was further adapted during the project – the final version (Table 12) appears in Appendix 2.

Capability Taxonomy

In addition, a second taxonomy was used to underpin the research approach, the Capability Taxonomy (based on Phelps, 2002; Phelps, Ellis & Hase, 2002). These researchers discovered there were a number of characteristics associated with capable or proficient computer users, that is the characteristics they exhibited and the way in which they learned. All constructs apart from technical knowledge involved an element of metacognition, e.g. “confidence in own skills and abilities” (self-efficacy), “problem-solving abilities and deduction”, (p. 98), and the ability to “take knowledge and

apply it to different situations" (Phelps, 2002, p. 99). Therefore a capable computer or ICT user was regarded as having particular dispositions (characteristics), and the ability to learn as opposed to knowing everything there was to know about technology. The characteristics associated with knowing how to learn included the ability to "experiment or play" through "trial and error" and be self-directed. Also being able to "consult others" such as peers or a mentor were also shown to be ways in which a capable computer user learned (p. 270). The Capability Taxonomy utilizes seven categories which are based on the dispositions of a capable ICT user. However, the characteristics associated with knowing how to learn are not included.

Table 3: Capability Taxonomy.

Capability categories	**The categories are used to describe observed participant behaviour or self reported participant actions, attitudes and dispositions (characteristics).**
2.1 - Confidence	Confident in own skills and abilities (self-efficacy) for using information communication technology (ICT). A persistent and autonomous learner.
2.2 - Problem solving	Is able to identify the nature of the problem, devise an approach and work towards a solution which contains digital elements. Demonstrates logic, inquiry, flexibility and creativity.
2.3 - Motivation	Has a positive attitude towards exploring and adopting new digital tools and strategies, extending and developing use of the known ones.
2.4 - Interaction	Able to share, collaborate or interact within the digital information environment when seeking information.
2.5 - Reflection	Has the ability to examine the practices and thinking of self and others in the digital environment.
2.6 - Technical aptitude	Uses a wide range of digital tools and strategies and draws on appropriate terminology.
2.7 - Beliefs	Has particular beliefs relating to both the ability to operate in a digital environment and about the value of this milieu.

The capability categories were considered along with Digital Information Fluency competencies (21st Century Information Fluency, 2009) and the term digital (rather than computer) has been inserted. The taxonomy was developed to describe a process of accessing and handling digital information and the characteristics of capable users in a digital information context. The descriptors were written to stimulate interpretation and discussion rather than goal statements couched in positive terms for people to aspire to. As such, all descriptors could be commented on in terms of the level of willingness or ability observed or reported, or the nature of the feelings and beliefs demonstrated or described.

This framework allowed for simplification under the headings; confidence, problem solving, motivation, interaction, reflection, technical aptitude and beliefs. It was re-worked during the interpretation process and the full Capability Taxonomy with sub-categories is in Appendix 2). Both taxonomies framed the process and application of the various instruments used in the project. The

relationship between the actual instruments and the research questions themselves is outlined in the next section.

3.4 Methods, instrumentation and analysis

Overall the multi-strategy approach (Bryman, 2000) was deemed to be the most complete method to allow fuller analysis of the empirical data and bring together the qualitative and quantitative aspects of the investigation, while supporting separate quantitative data analysis from pre and post surveys. A mixed methods approach for handling data is also recommended for negotiating the complexity of digital systems (Reeves & Hedberg, 2003).

The table below shows the instruments used to collect data to help answer each research question, and to define digital information literacy.

Table 4: Matrix of instrumentation used to collect data under each research question.

Research questions	**Instrumentation**
Investigate how staff and students access, and interpret digital information creating their own understandings using purpose built modules which are customisable and Web 2.0 strategies.	Surveys – Pre and post Action research workshops – researcher observations and notes focus group interviews Email forum Reflections – blogs, journals Action learning cycles Case studies
Ascertain how personal online learning environments and membership in a social networked community can influence digital information literacy.	Action research workshops – researcher observations and notes focus group interviews Reflections – blogs, journals Action learning cycles Case studies
Indicate how important digital information literacy is for lifelong learning of staff and students (including Maori and Pasifika), productivity and innovation.	Action research workshops – researcher observations and notes focus group interviews Reflections – blogs, journals Action learning cycles Case studies
Determine the standard of digital information literacy in the New Zealand academic workplace compared with other OECD countries.	Literature review OECD statistics
Outcome: A ***definition of digital information literacy*** for Australasia and inclusion of digital information literacy standards in the ANZIIL framework	Discussion - researchers and participants (students and staff) – focus group interviews. Discussions with ANZIIL, LIANZA and National Library personnel, and Manukau Institute of Technology library personnel.

A full representation of the process used for the different instruments is best shown by the Methodology Diagram below (Figure 5), and is further described in the section on Process – Data collection.

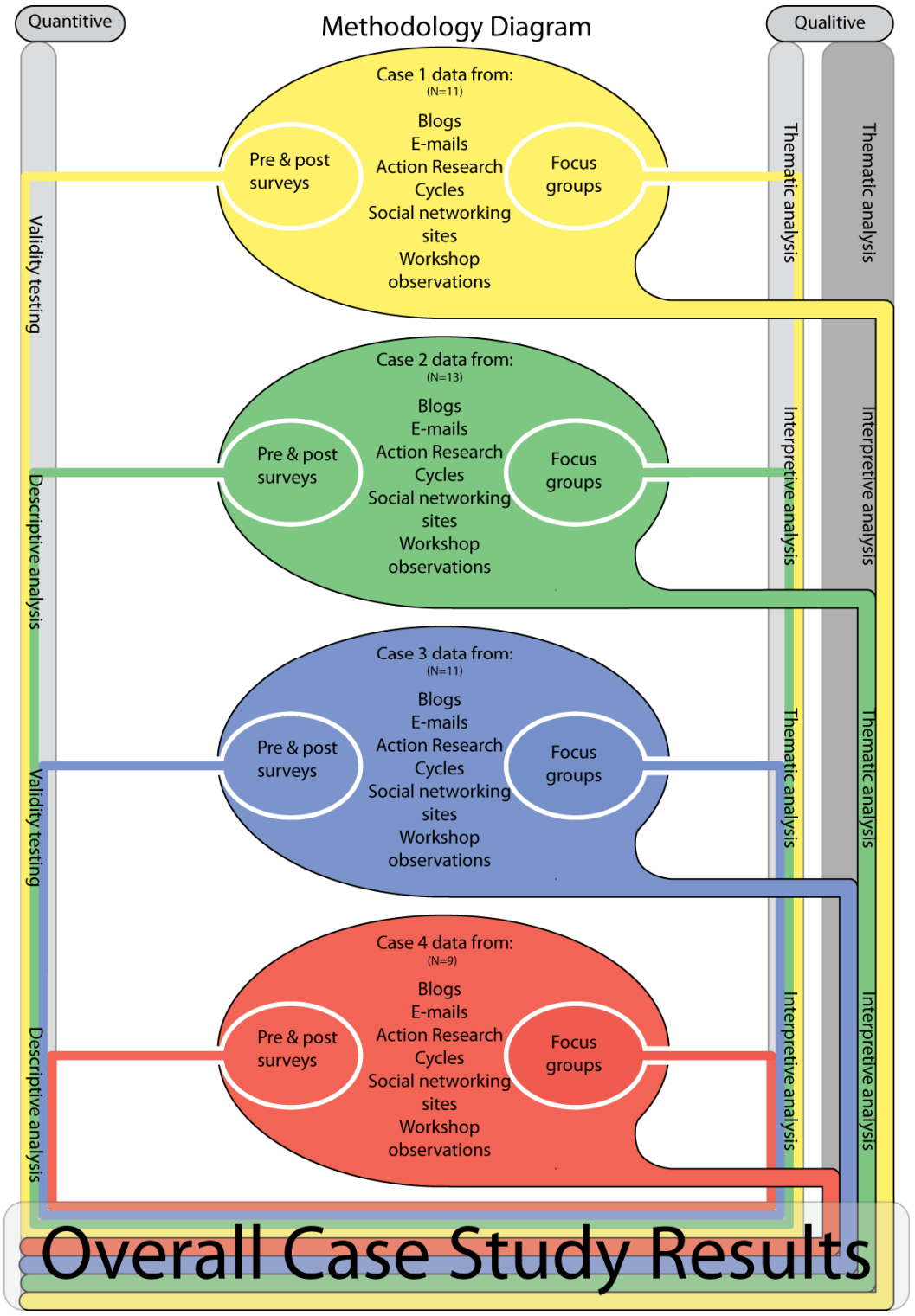


Figure 5: Methodology Diagram illustrating instrumentation used to collect data

Process – Data collection

Participants were introduced to the concepts of digital information literacy in the workshop setting, selected because of the support the interaction gives to a social constructivist approach to learning. Participants were asked during the workshops to identify and encouraged to work on solutions to digital information issues which they encountered in their work and/or study. An action research spiral approach taken from Coleman and Lumby (1999) was shown to participants as a way of assisting

them to plan, act, monitor and reflect on their progress, and this was utilized by the majority to record their learning journey. They were also asked to make use of use of a journal, weblog (blog) or other digital means to record their learning progress. This was an additional way of helping them to develop digital information literacy skills during the project. Participants were asked to fill in pre and post surveys as well as attend focus group interviews held at the end of the project.

1. Pre and post-surveys

Data collection included the use of pre and post-survey questionnaires which were completed online. The instruments (Appendices 6, 7 & 8) were designed to measure quantifiable aspects of digital information literacy and were informed by the work of Bundy (2004), Doyle (1992), Phelps (2002) and the ANZIL standards themselves. The surveys had originally been devised and validity tested for projects by Hegarty, Penman, Brown, Coburn, Gower, Kelly, Sherson, Suddaby & Moore (2005), and Penman (2007), with the digital information literacy aspects derived from Keen, Ritson-Jones, Coburn, Hegarty & McDonald (2006).

The survey data were used to provide much of the evidence of progress for groups and individuals engaged in the research project at the four participating institutions. They also provide demographic overviews of the groups. The online pre-survey was in most instances carried out during the introductory workshop session, in the presence of the researchers. The post-survey was filled out by most participants during the final workshop session. For almost all, it marked the end of their involvement. Except for the demographic data and comments, responses to each question used a five point Likert-type scale with a top level of 5.

Demographic data were collated separately for each institution. For the other survey questions the data from each individual were compiled into spreadsheet worksheets for each institution. Then post-survey data were added for questions which were similar so that comparisons could be made and changes noted over the duration of the project. Comments were also collated. Individual data for the surveys were used for two main purposes. Firstly they were referred to when individual case studies were being developed. Secondly the data became the basis for aggregation of data within and across institutions. Aspects of this will be presented and discussed in the Results chapter. Descriptions of how the survey data was analysed follow further on. The data were initially used to calculate a Digital Information Literacy (DIL) score for each participant as a baseline for comparison.

Data from the questionnaires also contributed to the building of the qualitative institutional case studies, and the overall case study via the thematic and interpretive analysis. Other key elements of the cases were derived from the face to face workshops and the written material produced by participants, the focus group interviews and researchers' notes.

2. Workshops

The participants were encouraged to attend workshops at their institutions over a period of 10 weeks, half compulsory, and the others optional. In the first workshop, participants were introduced to the project and given an overview of digital information literacy and social networking (Web 2.0) tools, such as the project wiki on WikiEducator, blogging, social bookmarking, and the like. They were encouraged to share the digital information issue which they wished to work on in the research project and completed the online pre-survey.

Thus the participants were to set their own agendas and outcomes or goals rather than being urged to follow a particular learning path. The role of the facilitator was not central to the process, and the participants were expected to be more self-directed and where possible assist each other as well either by direct teaching or by sharing what they had discovered.

The subsequent workshops followed the same pattern at each institution. Each workshop began with a round where participants reviewed and shared what they had been doing over the past week or fortnight, followed by group or individual exploration of topics of interest. The facilitators encouraged collaboration in the face to face workshops and hoped that participants would communicate and interact outside the workshops as well. Many did. A range of tools and strategies were introduced to participants, such as RSS feeds, Online Information Literacy (OIL) modules (http://oil.otago.ac.nz), wikis, digital resources and software, many of which were requested by the participants themselves. In some cases, access to such online resources was restricted to the venue of the workshop itself which meant participants could only use the tools when at the workshop. The project facilitators concentrated on responding to the developing aspects of digital information literacy which affected the personal learning environments of the project participants.

As part of the action research cycle approach to the research, participants brought ill-structured problems into the workshops, and worked within a scaffolded and semi-structured environment. In all cases they were guided to view their participation in the project from an action research perspective. Therefore the activities which were undertaken in the workshops and outside depended on the direction in which participants wished to go and their specific interests and needs. Participants were encouraged to use the Three Step Reflective Framework (Hegarty, 2005), and an action learning spiral (Coleman & Lumby, 1999) used in the project to capture their action research cycles. Individual goals were set, plans were made, then action was taken within the workshops or between them, and progress evaluated. Subsequent steps were then planned and the cycle began again.

As part of the workshop, discussions about particular topics which came up during the session were given group time. Also at the end of each workshop session, participants were encouraged to update and continue their reflective journals, their action learning spirals and maintain their interaction with other participants via a group email forum (if the group was using one), their blogs and other social networking sites. The facilitators recorded their own observations of the interactions and progress of the participants which contributed to the qualitative data collected for thematic analysis. Participants were asked to fill in a post-survey at the final workshop session and reminded to attend a formal focus group interview session.

3. Focus group interviews

After the conclusion of the workshop phase, focus group interviews were held in each of the institutions. Attendees were asked through the use of a semi-structured interview process (Appendix 8) to contribute to five areas: To jointly construct a definition of digital information literacy, and then to describe how participating in the project had helped them to make connections and create a personal learning environment, how the project had assisted with their original need or problem and whether the skills they had acquired would assist them in life long learning. The sessions were transcribed verbatim for analysis and along with the other data, analysed for the construction of the case studies.

Data analysis

The processes used for data analysis included quantitative methods for the calculation of survey data so that frequencies and self-efficacy scores could be obtained, as well as digital information literacy (DIL) scores. Although self-efficacy scores were compiled (Tables 15 – 22, Appendix 9) the data has not been fully examined as this was not the focus of the research. Instead the self-efficacy scores were integrated in the DIL scores as this was the emphasis of the research. Demographic data was compiled and collated to formulate descriptive data in the form of frequencies for some aspects, and to discover commonalities and differences. Survey responses for digital and traditional information contexts were calculated separately to make comparisons of information literacy skills on entry to and exit from the project and these are outlined in the next section.

Information literacy skills

An examination of the survey data was carried out to determine the skills in both traditional and digital information which participants perceived they had when they entered the project (pre-survey), and to determine how they had changed when they exited the project (post-survey). Questions included perceived levels of traditional (non digital), familiarity with New Zealand information contexts, and requirements for increasing digital skills within their study or work and for supporting others. These aspects were calculated separately to the other parts of the survey. Also a comparison of digital and non-digital information skills and confidence in using technologies was made. Responses to other sections in the surveys were used to determine the actual digital information literacy (DIL) score – based on use and confidence in using digital tools and self-efficacy scores. In the post-survey, participants were also asked how their information literacy skills had changed as a result of the project.

Digital information literacy (DIL) scores

A key element derived from the surveys is the Digital Information Literacy (DIL) score which was calculated for each participant. This was used for before and after project comparisons, and for commenting on similarities and differences between the participants and within and across institutions.

Scores for all questions, except responses in the demographic section of the surveys and parts of Question 13 and 14 were aggregated to calculate the DIL score. Survey responses for questions about digital skills for accessing and using information, confidence in using technologies for information, use of digital tools and confidence in using as well as scores for self-efficacy were collated as part of the overall DIL score. Where questions were worded so that responses indicating a high degree of DIL, elicited low scores, e.g., 1 or 2, from the Likert-type scale, all responses for those questions were inverted (to 5 or 4) before aggregation of data. For convenience, in allowing comparisons to be made, the raw DIL scores were converted to percentages by measuring them against the maximum total possible DIL score. The calculation method used is based on work previously done by Phelps (2002) and Hegarty et al. (2005). Changes in DIL scores from pre-survey to post survey were calculated in terms of percentage increases or decreases. Mean increases and decreases for each institution were derived from those results so comparisons could be made.

In the post-survey, participants were also asked how their use of digital tools and their confidence using them had changed as a result of the project. As well as survey analysis, other data was used to develop case studies which is explained next.

Case study construction

The manner in which case studies were developed is explained in this section.

Individual case studies

A variety and range of data was used to build individual case studies. Percentage DIL scores for each individual were used as an indication of their digital information literacy level. Pre and post-survey data was compared to reveal any shifts that had occurred. The pre and post-survey data was included in the individual participant case descriptions.

Additionally, qualitative data was collected from participant action research cycles and this included: Reflective writing on blogs or in journals, action learning spirals, content from email forum discussions, researcher's notes from workshop observations and contributions to the focus group interviews. All this data was combined with aspects of the quantitative data where appropriate. This qualitative and quantitative material was examined using a series of criteria developed for each of the first three research questions (Appendix 10).

Participants' material was also annotated using categories developed for DIL Taxonomy (Table 12) (based on the ANZIL standards) and the Capability Taxonomy (Table 13) as shown previously in the Theoretical Framework section. The collated material was then also described using a template of questions which related specifically to each research question, for example for Research Question One, the following evidence was sought:

1. What was the person's starting point in terms of their:

- knowledge
- skills
- beliefs

} of/in/about tools, techniques, social factors, learning etc.?

2. What was the person's goals in terms of their:

- knowledge
- skills
- beliefs

} of/in/about tools, techniques, social factors, learning etc.?

3. What did the person do to achieve their goals?

4. What did the person learn?

- knowledge
- skills
- beliefs

} of/in/about tools, techniques, social factors, learning etc.?

5. Did the person achieve their goals?

The rest of the questions and the full template which was used for all the research questions can be found in Appendix 10). There is also a working example demonstrating how the template was used (Appendix 11).

A selection of individual cases can be found in Chapter Five. Individual case studies were combined to form a description for each of the four institutional case studies.

Institutional Case Studies

Descriptions for each group of individuals were prepared as institutional cases. These were created by combining data from the individual cases through a content analysis process. The categories in the DIL and Capability Taxonomies were used to interpret the individual cases and examine them for consistent patterns and themes. Example of institutional case studies can be found in Appendix 12. The four institutional cases were then summarised using the same categories and an overarching case study for the project was developed.

Overall Case Study

Overall, 42 participants started the project, and seven dropped out. From those that remained, an overall summary was compiled from the case studies of the four institutions which included the combined focus group interview data, the pre and post-survey quantitative data and the thematic analysis of the four institutional case studies as described above. These last, combined data sets were then used to construct an overall case study wherein the collated and combined findings for the project are described. Validity of the survey had previously been tested when the survey was used in three other research projects (Penman, 2007; Coburn et al., 2006; Hegarty et al., 2005). Originally the self-efficacy section of the survey had been used by Phelps (2002) and a pilot of the survey developed from her work was tested before being used for a previous project (Hegarty et al.,2005).

3.5 Quality of the data and analysis

To ensure the quality of the research several methods were used. Firstly the choice of a mixed methods and multi-strategy approach (Reeves & Hedberg, 2003; Bryman, 2000) has enabled *triangulation* of the data as well as *bracketing* where data is examined using different methods and from different perspectives. In a study using qualitative methods, different terms are used to those in a quantitative study (Mertens, 1998). Two of the most common terms (credibility – internal validity and transferability – external validity) are combined and described below to demonstrate how quality was assessed in this project.

Credibility (internal validity)

Several aspects of the research contributed to the credibility of the findings. For example there was *prolonged and meaningful engagement* by participants over 10 weeks, the collaborative nature of the research meant there were regular opportunities for *peer debriefing* by the researchers during workshops and meetings. The researchers' notes and reflections throughout the project contributed to p*rogressive subjectivity,* and the checking of each other's notes and, also the focus group interview transcripts and the material for case studies enabled met the criteria for *member checks*. The presentation of a diverse range of individual cases and, the inclusion of examples which did not meet the status quo in an overall case study has ensured *negative case analysis*. (Mertens,1998.)

Transferability (external validity)

This aspect was checked through detailed description about the action research process and the participants' learning process and skills and capability with regard to digital information. Also several different types of cases were developed. Generalisability of the findings to other contexts is dependant on external validity or transferability. In this case, random sampling was not strictly possible due to the nature of the research. Although individuals were able to self-select, recruitment was also dependant on a snow-balling effect, that is, word-of-mouth by staff and students with a particular interest in the topic. However, the *thick description* provided through the case studies will enable others to make their own judgement about how applicable the findings might be to their own contexts (Mertens, 1998) and develop an understanding of the model in use, thus anticipating the outcomes of its use within a particular context.

Therefore, the researchers are confident that the methods used in this research study have assured findings of the best possible quality which demonstrate validity.

3.6 Summary

A diverse range of data was collected, collated and analysed to investigate the research questions. Several methods were used to collect and analyse both quantitative and qualitative data in an action research process. This work was based on previous research and also frameworks developed by the researchers.

Notably, there were five main sources of results for participants:

- Demographic description;
- An indication of baseline information literacy;
- Baseline scores for digital information literacy;
- Changes to information literacy and digital information literacy exhibited on exit from the project;
- Measures of self-efficacy for using ICT;

Additionally, there were three types of case study formulated:

- Individual case studies;
- Institutional case studies;
- An overall case study.

This material is described in the Results chapter.

Chapter Four: Results

4 Introduction

In this chapter, the outcomes of an action research approach and the development of case studies, prepared as part of an analysis and interpretation process, are reported. A wide range of data collection methods and analytical approaches were used to provide both descriptive data and qualitative outputs. Firstly, a definition of digital information literacy is presented to set the scene for the findings. This is followed by an explanation about the participants and some insight into the demographic mix, followed by a description of participants' incoming perceptions of their level of digital information literacy. Other results are organised under each of the four research questions. Following a presentation of the findings for research questions one and two which are related to skills in using tools and strategies for digital information processes, there is a section on how participation in the project influenced digital information literacy (DIL). Subsequent to this, are the findings for the other two research questions related to DIL and lifelong learning and the standards of DIL in New Zealand compared to other OECD countries.

Additionally, one of the intended outcomes for the project was to develop a definition of digital information literacy. The process for formulating a definition occurred over the length of the project, and involved a multi-faceted process:

- Discussion amongst the researchers;
- Consultation with key personnel from the library and information sector;
- Discussion with participants in focus group interviews.

The following definition was agreed on, and is regarded by the researchers as pivotal in stimulating discussion about this very important subject.

Definition of Digital Information Literacy

Digital Information Literacy is the ability to recognise the need for, access, and evaluate electronic information. The digitally literate can confidently use, manage, create, quote and share sources of digital information in an effective way. The way in which information is used, created and distributed demonstrates an understanding and acknowledgement of the cultural, ethical, economic, legal and social aspects of information.

The digitally literate demonstrate openness, the ability to problem solve, to critically reflect, technical capability and a willingness to collaborate and keep up to date prompted by the changing contexts in which they use information.

4.1 Who were the participants?

The researchers sought a diverse group of participants recruiting from both academic and general staff and students. This diversity is represented in the demographic data presented in this section. Included in the data is participants' roles (i.e., student, general staff/allied staff or academic, both student and staff member), gender, ethnicity, age, experience with computers, Internet use, qualifications held and enrolled in, and teaching/study discipline. In Table 5, participant numbers in the pre and post-surveys and their roles in each institution are displayed.

Table 5: Roles of respondents in the pre-survey and post-survey for each institution (n=42).

Institution	Academic staff		General staff		Student		Both student and staff	
	pre-survey	post-survey	pre-survey	post-survey	pre-survey	post-survey	pre-survey	post-survey
One - (n = 11)	2	1	4	4	4	4	1	0
Two - (n = 11)	6	6	2	2	3	3	0	0
Three - (n = 11)	2	3	0	2	4	3	5	2
four - (n = 9)	2	1	2	1	2	2	3	3

The reason for the large number of participants who were both staff and students in Institution Three is explained by the fact that many academics were involved in ongoing study towards teaching qualifications as a requirement of their employment, and some general staff who were also enrolled in relevant ongoing study. In Table 6, the distribution of gender, ethnicity and age distribution for each institution at the start of the project is displayed. Not unexpectedly, the majority of participants were New Zealand European, female and in the age bracket 46 to 59 years. Participants identifying as Maori (Institution Two, n = 3) and as Pacific Island, e.g., Samoan (Institution Four, n = 1) were in the minority, also as expected. However this makes it difficult to ascertain a reliable snapshot for these particular ethnic groups who are of specific interest in this project. Participants of Chinese ethnicity were present at a higher frequency than other ethnic groups apart from NZ European.

Table 6: Distribution of gender, ethnicity and age as numbers of participants in the pre-survey (n = 42).

Institution		**One (n=11)**	**Two (n=11)**	**Three (n=11)**	**Four (n=9)**
Gender	Male	3	3	1	4
	Female	8	8	10	5
Ethnicity	Chinese	1	1	0	0
	Dutch European	0	1	0	0
	German	1	0	0	0
	Indian	1	0	0	0
	Maori	0	3	0	0
	North American	0	1	0	0
	NZ European	8	5	11	8
	Samoan	0	0	0	1
Age	60 years or older	2	1	0	1
	46 to 59 years	5	6	6	2
	31 to 45 years	3	3	2	2
	21 to 30 years	1	1	3	3
	15 to 20 years	0	0	0	1

The first language for the majority as expected from the incidence of ethnic groups, was English with individual speakers of Samoan, German, Chinese and Dutch. Other information sought from participants in the pre-survey related to computer experience and Internet usage and this is illustrated in Figure 6. Clearly Institutions One and Three had participants with the highest level of computer experience and Internet use.

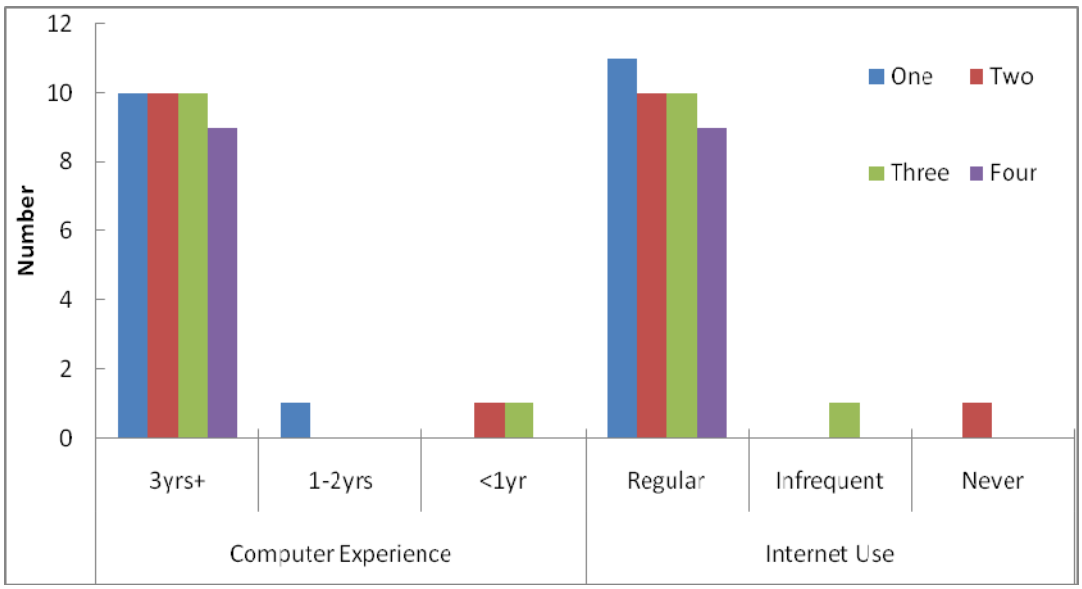


Figure 6: Pre-survey estimations of computer experience and Internet use for four institutions (n = 42)

Other demographic information sought from participants was about their existing academic qualifications, as well as those for which they were studying. They were also asked to indicate whether they were in part-time or full-time study, and a foundation, undergraduate, postgraduate or distance student. Teachers were asked about their teaching discipline and whether they taught at certificate, degree or postgraduate level and if they were teaching distance students. As expected in an educational organization, the majority of participants were found in the pre-survey to have a range of existing qualifications, and overall were well educated. For example, participants mentioned school-based achievements, e.g., Year 13 Certificate of Academic Achievement, NCEA, and tertiary level certificates, diplomas, bachelor or masters degrees, and postgraduate certificates or diplomas in a range of subjects - art, education, health, information systems, law, science, human resources, policy, graphic design, business, sport - and PhDs. A small number of participants stated they had no qualifications.

There were a range of levels of qualification for which participants were studying - foundation skills, certificate and diploma programmes, postgraduate diploma, bachelor and master degrees, PhD. Participants' areas of study and teaching disciplines were broad and diverse (Table 23, Appendix 14) and included education, business, management, foundation, health, librarianship, design. The distribution of students in part-time and full-time study, at undergraduate and postgraduate levels, and at certificate and foundation levels was disparate with no particular level of student apparent. Full details can be seen in Table 7 below.

Table 7: Student activity for each of four institutions (n=42).

Institution	One	Two	Three	Four
I am not a student	6	6	3	4
Full time student	0	2	2	0
Part time student	0	1	1	0
Full time student; Postgraduate student	1	0	1	0
Full time student; Undergraduate student	2	0	1	1
Full time student; Certificate course student	0	1	0	0
Full time student; Certificate course student; Foundation course student	0	1	0	0
Full time student; Foundation course student	0	1	0	0
Part time student; Postgraduate student	0	0	0	2
Part time student; Undergraduate student	1	0	0	0
Part time student; Distance student	0	1	0	0
Part time student; Distance student; Postgraduate student	0	1	0	1
Part time student; Certificate course student	0	1	1	0
Undergraduate student	1	0	0	0
Postgraduate student	0	1	2	1
Distance student	0	0	0	0
Foundation course student	0	1	0	0

The second part of the pre-survey questioned participants about their digital information literacy skills and the findings for this follow next.

4.2 Digital information literacy skills on entry

Participants were asked in the pre-survey about their perceived skills in using digital or electronic technology for locating, retrieving, analyzing and applying information relevant to their study or work, compared with their perceived level of skill in using traditional means such as libraries for the same task. According to responses to the pre-survey administered at the start of the project, 32% of participants rated themselves as having a higher level of skill in using traditional methods when accessing and applying information compared to the 14% who said their level of skill using digital technologies for use with information was higher. However, 55% regarded their skills for both traditional and digital approaches to using information as the same. Overall, 45% rated themselves as having high or very high traditional skills, and 32% rated their digital skills above average (Figure 7). In comparison, half the participants rated their use of digital skills as average whereas 39% perceived their traditional skills as average.

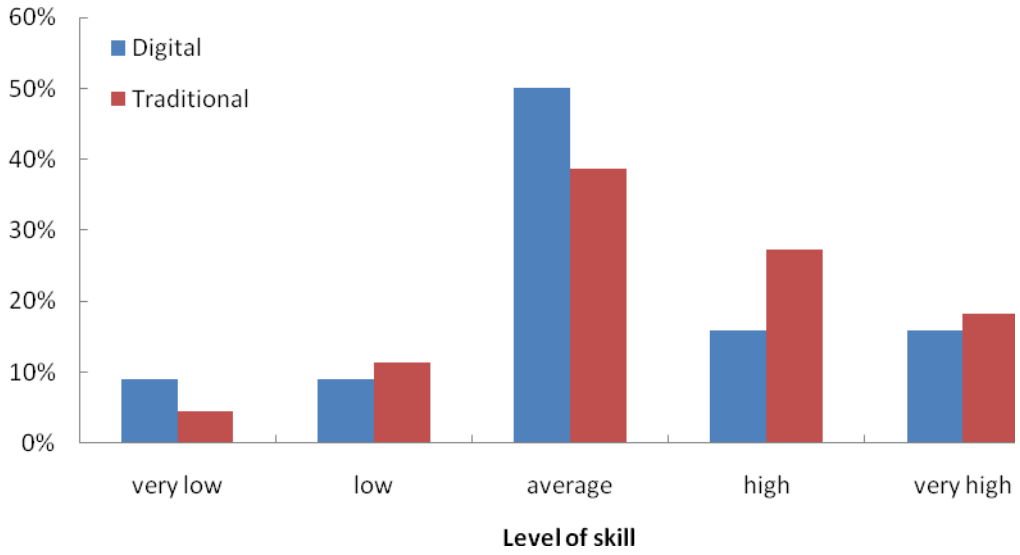


Figure 7: A comparison of traditional and digital information literacy skills for participants on entry into the project (n=42).

Although over half the participants were found to perceive their skills in using traditional and digital information as similar, when scores were compared between institutions there were several differences and these are depicted in Figure 8. For example, in three out of four institutions, participants more frequently considered their traditional and digital information skills to be the same. In Institution Four, it is notable that traditional information skills were rated more highly by 44% of participants. In all cases, apart from Institution One, participants more frequently regarded their traditional skills as better than the digital ones.

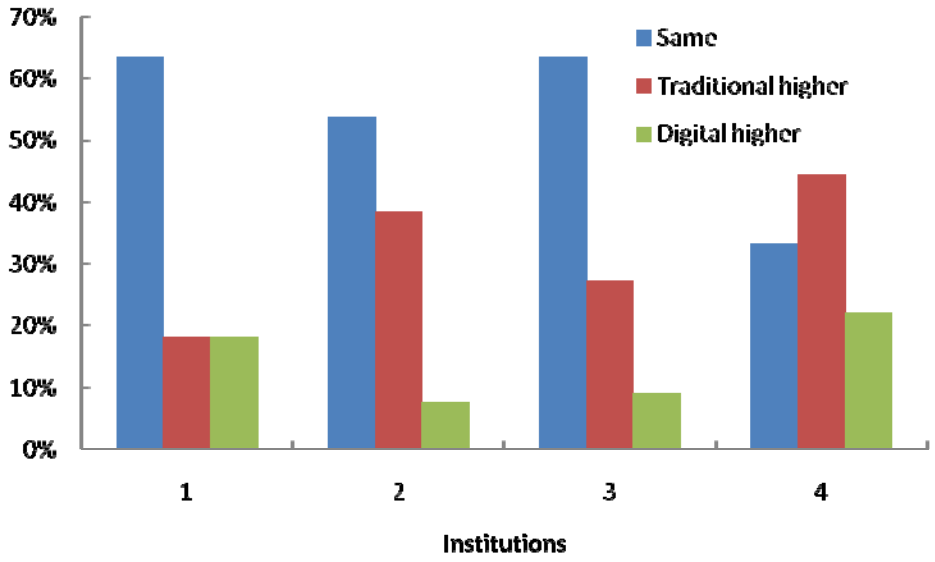


Figure 8: Frequencies where information skills using traditional and digital approaches were higher or the same for each of four institutions (n=42).

Participants were also asked in the pre-survey to rate their lack of confidence in using digital skills to prepare or create materials, and were given the opportunity to indicate their future needs for information gathering. With respect to the latter, they were asked to what extent they expected to need to use *more sophisticated information gathering skills in increasingly*

demanding academic contexts. They were also questioned about their need to develop their personal digital information skills (pre-survey, Appendix 6). Interestingly, overall across the four institutions, 39% rated themselves as confident in using digital information skills, and, 83% stated they needed to develop their skills to accommodate the more sophisticated academic contexts into which they were moving in the future. Additionally, 80% of participants required better personal digital information skills to support or teach other people. This gap between perceived future needs and confidence can be seen broken down for each institution (Figure 9).

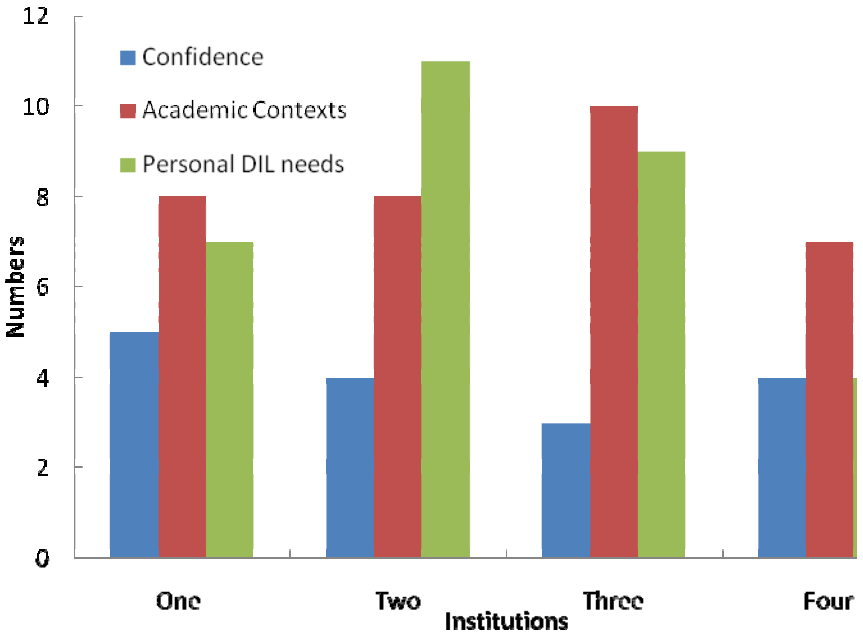


Figure 9: pre-survey of participants' confidence in using digital technologies, personal needs and academic contexts.

For example, in Institution Two, the majority of participants stated in the pre-survey that they needed to develop their skills in digital information literacy (DIL) in order to support and teach others (this is shown as personal DIL needs on Figure 9). However, only a few participants stated they were confident in using digital technologies for preparing or creating materials. Participants in the other three institutions rated themselves with higher levels of digital technology confidence in comparison to Institution Three, and the majority of people stated they were moving into increasingly sophisticated academic contexts. Interestingly, participants from Institution Four did not demonstrate a gap between their digital technology confidence and personal DIL needs.

In the following section, findings associated with each of the research questions are outlined.

4.3 Strategies and tools - access and interpretation of digital information

In this section, findings for Research Question One are outlined: How staff and students access, and interpret digital information creating their own understandings using purpose built modules which are customisable and Web 2.0 strategies.

Under this research question, the place of the workshops in supporting participants to address self-identified learning needs in relation to digital information literacy, is explored as well as what participants did to make changes in their skills, and why this worked or did not work. As mentioned in the methodology, each participant joined the project with an actual

issue related to their digital information literacy, and with the aim of developing, and extending their digital information skills; regardless of whether they entered at a basic, intermediate or advanced level of skill. An action research approach using an action learning cycle (Coleman & Lumby, 1999) was used along with a range of strategies. Participants were encouraged to set goals for themselves from day one as part of this process.

The strategies employed in the project provided immediate data, that is, data recorded close to the time of the activity. The strategies utilized in the project had the advantage of enabling participants to share their progress and frustrations with others, and enabled facilitators to provide immediate feedback and also to plan for subsequent sessions. In addition to providing the opportunity for participants to gain fresh insights, through a reflective process, interactions in the workshops as well as via blogs and email discussions, there were also retrospective measures such as post-surveys and focus group interviews which gave participants the chance to reflect on their learning and progress. Data for this section has been mainly compiled from themes which emerged in the individual, institution and project case studies supplemented by pre and post-survey information, and focus group interviews.

Findings for this section are arranged under the following themes:

- Goals – the setting of goals and examples;
- Time and permission to play – the importance of having dedicated time to explore digital tools and information;
- Approaches – the way in which goals were actioned;
- Types of learning – includes skill-based learning, knowledge and learning, learning and attitude with mention of reflective and professional learning;
- Communication – the ways in which participants interacted to share and exchange information;
- Attitudes – this includes motivation, confidence, sharing;
- Tools explored by participants – includes a range of technologies and includes Web 2.0 tools;
- Customizable modules – the way in which learning objects for online information literacy were used.

Goals and how they were achieved

Participants were strongly encouraged to consider their goals right from the beginning of the project. Some had joined with clear ideas about what they hoped to achieve. For example, one participant (Mary) wanted to learn to use PowerPoint and Excel to support her first venture as a tutor and her research respectively. She also had a less specific goal of learning more about online communication tools. Another person (Sandra) wanted to be able to communicate better with family members who appeared to her to have much more advanced digital skills than she had. She also wanted to find a way for her son to keep a digital record of a special overseas holiday, including a method of storing and presenting photos along with text. Chrissie had a main goal of learning sufficient Linux to enable her to operate her small new computer while travelling.

The participants mostly came to gain the benefits of working with others with similar needs or interests, and to take advantage of ongoing support for extending their learning using

unfamiliar tools and methods. What occurred was rather less straight forward. For example, Ray who intended exploring Second Life and its educational potential discovered Scratch (a free authoring tool) through another group member, and seized on this opportunity to create games with his school holiday group. Institutional barriers to the use of Second Life possibly contributed to this diversion, but Scratch opened many doors for the participant and generated much enthusiastic exploration and practice.

Participants' progress in relation to the time they had to play and explore and how this impacted on their skills and learning, was an important issue which came to light in the project. These aspects are addressed in the next section.

Time and permission to play

Having a time set aside for working on their goals in the project was really valuable for participants. This came through strongly in the focus group interviews from Institutions Four and Two. Having this time gave participants protected time to play with new tools and work towards achieving their goals. While participant investment in time varied considerably across and within groups, for most people the response to workshop sessions was similar in that participants all attended compulsory workshop sessions once a fortnight, if at all possible. They usually attended the in-between optional sessions as well, or used these as an opportunity to catch up if they had missed a compulsory session. Work on their skills and goals for the project between sessions varied greatly. Some participants sometimes did nothing, others - especially those with clear work related, or personal objectives, worked intensively and involved family, friends and online contact people in what they were doing. Most made some effort to record their process and thoughts, but this did not necessarily match the extent of their achievements. One person, for example, who prepared a great volume of work-based material using new methods and tools, gave little time to recording what was done.

Associated with use of time, was a theme which came through from each institution: being given permission to play. People felt that attendance at the workshops gave them a set time when they could explore and play (meaning to tinker and try out new tools and strategies). Many participants said during the workshops that they had to overcome feelings of guilt. Exploration of web tools was something they thought should not be done in work time, or it was something that a busy person could not afford to do. One person had to be persuaded that she did not need to come to work at weekends in order to feel OK about actively developing her digital information literacy. Other peoples' perception of what constituted work and play also had an effect on participants. For example, Sarah said in the focus group interview,

> There's so much blurring of the lines between work and the computer, blurring between what is work and what is so called play. ... and it really came to the crunch the other day. My husband came home and said what are you doing, why are you spending half the day on your blog writing something and he sees that as play, and Second Life is even worse of course. And he sees that as play whereas it is not, it is work.

It was evident during the project that without this play component people were not really able to see new possibilities, or gain the confidence they needed to try new tools and methods. This became evident when participants mentioned during workshop sessions and in the focus group interviews at the end of the project that just following instructions and going down someone else's pre determined path for learning had often failed them in the past. Additionally some indicated in the pre-survey and/or were reported as commenting in the early workshops, that they had very low regard for their ability to gain new digital skills and knowledge. At the extreme end of the spectrum this situation had reached the stage where

two people in Institution Four admitted in discussion with the facilitator and in the focus group interview to having unpleasant physical symptoms (possibly related to their anxiety) when confronted by a digital task. These feelings disappeared during the project to the amazement and relief of the two participants.

In addition to time and permission to play, the way in which participants approached the tasks they engaged in during the project was noted and this is described next.

Approaches

A number of different processes were used by participants to achieve their goals. Some participants had very specific goals that could be achieved during the project, and they worked systematically towards achieving these. For example Naia entered the project because she felt her information searching skills were not adequate. Therefore in line with a specific goal to improve her search skills, she worked systematically through the Online Information Literacy (OIL) modules.

However, participants with specific goals to which they rigidly adhered were in the minority because participation in the workshop sessions revealed previously unknown gaps in skills and knowledge and opened up new possibilities for most. The use of an action research spiral for activating and monitoring progress enabled a dynamic goal-setting process. Some of the participants had previously thought they knew more than they did. This group often showed surprise at the number and type of tools that were freely or easily available to support their study or work that they hadn't previously known about. For example, open source software and social networking tools such as social bookmarking (Delicious.com), slide and audio sharing sites (Slideshare.com, Myplick.com, Blip.tv, Internet Archive). Participants who experienced this sudden awareness of what they didn't know frequently adjusted their goals as a result of the new information.

Something else noted in the workshops was the way in which participants often deliberately chose to put aside their initial plans in order to be able to explore the range of tools which others in the group were using, or were learning to use. These participants chose to be exposed to the range of tools. Usually they took enough time to get a feel for the tool, they made notes or in some way recorded something they wanted to remember about the tool so that they could come back at a later point after the project. As such they were evaluating the tool against their own set criteria, which commonly was about its potential value in supporting their ongoing study or work. Each participant usually selected a tool that they felt would be useful for them at the time, thereby practising and developing confidence in the use of the tool while in the workshops. Some of these participants said to the researchers that they scored themselves lower in some aspects at the end of the project after becoming aware of what they didn't know. For example, one participant at Institution Four approached a facilitator, mid project, with concern about the extent to which she had initially overrated herself, through what she now saw to be ignorance and a desire not to admit how little she knew in general.

Another characteristic noted by the researchers about participants was that some tended to be the explorers – they often had more experience of using a range of tools, and were not concerned about taking risks. This group were willing to explore possibilities, using a range of tools, trying out features of the tools, and determining what would meet their needs. They seemed to approach their learning more haphazardly, but usually it was linked to their work and study needs. They benefited from being able to play with the tools in the supportive environment provided by the workshop sessions rather than playing with tools on their own. In other words, by having someone sitting alongside them assisting when they needed it, they said they became more confident to take risks. This was observed by all the researchers during workshop sessions.

Few participants in their blogs or journals, outlined any criteria for determining whether a tool of process was meeting their needs. Their reflections usually introduced their need regarding digital information, listed the options they intended to explore, or had explored, and then a solution (or one of the tools) was selected for ongoing use. It is worth noting that tacit knowledge is a feature of working with the complexities of the digital field, and it is well known that trying to make this knowledge explicit can be very difficult, or sometimes annoying for the person concerned Polanyi (1997). This aspect was observed by the researchers.

Workshop facilitators/researchers sometimes had to walk a tight rope between wanting to know what the participant was thinking in order to offer meaningful support and encouragement, and allowing participants flexibility and freedom to find their own path. The researchers were aware that getting participants to strictly record reflections, or engage in too much whole group discussion, might interfere with the enjoyment, progress and time available for their self-directed learning and exploration. Therefore, participants were encouraged to record their progress and ongoing goals at the end of and between workshop sessions, but not rigidly made to fill out forms or write to pre-determined criteria. However they were introduced to a Three-Step Reflective Framework and template which they could use to guide their reflective writing (Hegarty, 2007). A small number made use of this framework, but the majority preferred to write using their own free-range approaches, and it was not in the brief of this research project to measure the level or amount of reflective writing demonstrated by participants.

As discussed, participants engaged in a broad range of approaches to the issues they brought to the project workshops during their time in the project. It became evident that as well as using different approaches to tackle their digital information needs, participants also exhibited multiple modes of learning, and these are discussed in the next section.

Types of learning

Learning in the project was found to occur across the skill, knowledge and attitude domains (Hunt, 1995; Bloom & Krathwohl,1956) as well as for professional purposes (professional learning). Participants also demonstrated a process of reflective learning. The way in which learning came about in the three domains was discovered in several ways. Firstly, the way in which participants gained skills was a key focus for the project and investigated through the range of methods used to gather data, and as such is mentioned in other sections. For example, changes to digital information literacy are outlined in the section called: Overall digital information literacy scores. Secondly, the way in which knowledge was gained as ideas and issues, not previously considered was discussed during workshop interactions where problems were addressed and unique solutions found. Thirdly, attitude change was observed by facilitators and recognised by participants in their comments both written and spoken. Each of these aspects is further developed and illustrated with examples in the subsequent paragraphs and sections, along with explanations of professional and reflective learning which is embedded in the examples.

Skill-based learning

Generally participants' pre-workshop goals tended to be skill focused, e.g., finding out about using open source software and operating systems or how to search the Internet more effectively, or how to use a new tool.

An example of skill-based learning which participants undertook was the playing which participants undertook when they discovered or were introduced to a new tool or strategy. For example, participants were introduced to the social bookmarking facility at: http://delicious.com. At a skills level, participants registered on the site, and went step-by-step through the instructions to set up an account for themselves, and to obtain the browser

buttons for saving bookmarks. They also learned how to save resources from the Internet and how to tag them for sharing and accessing later. These were all skills necessary to be able to utilise the digital facility effectively. In the process of learning the necessary skills for accessing and using the social bookmarking facility, participants also gained new knowledge not only about a Web 2.0 tool but also about a social way to interact on the Internet, and a way to store and share resources collaboratively.

The learning of the skill was at a basic level of digital literacy, and it was not until they went away and actually used the skill in their work or study, that they were able to take their learning to a deeper level; they did this when they successfully applied the skill in a different context and were able to transfer what they had learned to a different setting. This transference of learning was reported on their blogs or in their journals, and in the workshop sessions, and as such became evidence that they were engaging in reflective learning whilst learning new skills.

Reflections which were written by participants demonstrated that a broad range of professional learning was occurring when they used the skills which they discovered in the workshop sessions. As an outcome of the research project, use of Delicious social bookmarking was a skill which several participants started to use with colleagues and students to gather resources for classes or for projects. One participant in particular was interested in social bookmarking for her own research purposes. Initially, she was quite reluctant to even try it, but then found it extraordinary that material really hard to find in a relatively obscure field had already been located and made available by others. It is worth noting that a reasonable level of confidence in their own abilities (self-efficacy) is needed for this learning to happen as users have to be prepared to make mistakes when trying out the skill (Hegarty et al., 2005).

However, as the project workshops rolled out over the 10 weeks, skill-based goals were adjusted, and from time to time overlaid with more knowledge based concerns, such as the security and ethical issues associated with using web-based technology. Researchers observed that for some the learning remained predominantly at the skill level, for others learning also occurred in the knowledge and attitude domains.

Knowledge and learning

At the start of the research, when participants were introduced to a range of resources for tuning their digital information skills, the majority were familiar with accessing information on the open web and many were using social technologies such as Facebook or Youtube. However, only a minority were already working fully within a social networking and Web 2.0 environment and were actively keeping blogs. Therefore, when participants were shown new tools and strategies for accessing, using, managing and creating digital information sources several things happened.

Individuals built up their bank of knowledge through trying out new skills and by exploring digital environments which had previously been unfamiliar to them or were accessed in ways they had not previously tried. For example, during one of the workshop sessions at Institution Three, participants were engaged in a demonstration and discussion about the concept of bringing information to them as opposed to always having to search for information. Consequently they were shown how to set up a personal web space using RSS feeds and sites such as Google reader or Bloglines. Therefore their knowledge about how to access information efficiently from the web was changed.

The other concepts which intrigued participants, and in some cases bothered them was the easy availability of information on the Internet, particularly material which they created and

stored on web-based sites. For example, some people were not at all comfortable with storing or creating material on the Internet if the whole world was able to see it or take it.

The ethical dimensions of using information in an open environment, in particular, intellectual property and copyright were also areas of interest for participants. As a result of information conveyed to participants about this very important area and their explorations on the subject, they were able to critique the different options available to them. Instead of having to accept one way of presenting information such as *all rights reserved*, they investigated options such as Creative Commons and the use of works in the Public Domain. Hence participants were given the opportunity, through developing a broader knowledge-base, to examine their beliefs and make informed choices about how they accessed and used others' information and made their information available to others For some participants this was a surprising new world and many participants at Institution Three appeared to have an open attitude to ideas such as fairer ways of sharing and using information.

In the next section, other ways in which participants' attitudes were altered through their participation in the research are outlined.

Learning and attitude

Some participants described the need to "get over [them]self", and also mentioned attitude: "realising that my attitude is all I need to change to be able to do anything I want in this area" (Carol). For this participant and others in a similar situation, the barriers to learning or developing their digital information literacy came not from time or costs, or lack of opportunities, but from their intrinsic locus of control, that is, their attitude to learning to use technology (Phelps & Graham 2008; Phelps, 2002). Additionally, participants in this category learnt to persist on their own when issues arose, until they found a solution to the task they had chosen.

Hence they were exhibiting a characteristic regarded as indicative of a high level of self-efficacy (Hegarty et al., 2005; Phelps, 2002). They also discovered that making mistakes was okay and part of the learning process, and that when something went wrong with the technology it was not their fault. It was observed by the researchers on several occasions in the workshops that participants with a low level of skill, tended to blame themselves when something went wrong. This was particularly evident when there was a technical problem during a workshop, and neither a facilitator nor participants could undertake tasks. For some individuals, particularly those who rated themselves lower in tool-related knowledge and skills in the pre-survey, the major learning was not in development of skills but in the changing of previously held beliefs about either themselves or the technology; this change was observed over the course of the workshops and also came through in post-survey comments. Attitudes of determination tended to have good outcomes, and some examples of how this was particularly important for professional learning are outlined next.

Professional learning

This aspect refers to the knowledge building which participants did specifically for their work and professional development. For example, James on entry to the project already had extensive knowledge of Web 2.0 based communication. He was exploring the use of blogging for professional purposes, and set up a blog within which he made extensive references to literature associated with academic blogging. He selected pertinent quotes, and then added his own comments as he grappled with the benefits, constraints and potential of this method of communication within and beyond groups. This participant also took the opportunity to reflect on the process of using new skills and as such demonstrated a high degree of reflective learning.

For a few participants the focus remained largely on the skills they needed to operate in their professional environment. One person, at the stage of having to move from using Overhead Projector (OHP) transparencies for presentations to using computer-based presentations focussed almost entirely on learning how to create interesting PowerPoint presentations including photographs, scans and Internet links. She was then able to help a colleague. All her material was prepared for lectures. She also spent time pursuing new ideas for her video conference links with Japan. While incidental related issues were considered her focus was strongly work related.

It was evident that participants were engaging in tiered learning and demonstrating several different types of learning in three domains - skills, knowledge, attitude – and in the form of professional learning and also reflective learning. Partly the success of the participants' progress with learning about digital information tools and strategies depended on a change to the way they communicated, and this aspect is outlined in the next section.

Communication

For the majority of participants, learning appeared to be consolidated, and confidence enhanced when they were able to communicate with others. They not only communicated verbally within the group, and engaged in two way digital exchanges within the group (email or blogs), and/or with the researchers, but they also interacted with colleagues, friends and family who were non participants. To be able to do this several participants commented on how important it was to acquire the technological language needed to ask appropriate questions and to understand replies. Some discussed how, prior to the project, they would turn off to such conversations. During the project and afterwards in the focus group interviews some participants described feeling more confident and more able to discuss and join in conversations about digital materials and tools. For some this was a major achievement of which they were very proud. Others described during the workshops how family members had noted a change in their knowledge and/or skills, remarking on this to the individual. For a person previously lacking digital confidence, knowledge and skills it was the special moment when they able to show other people how to do things.

In their blogs, participants communicated their feelings openly about the help they had received by participating in the project, and on the value of being part of a group, where the sharing of varied experiences could contribute to solutions. The different means for communication in the project - blogs, email forums, a social networking site, workshop interactions and discussions, etc. - assisted greatly in this aspect of support. They even appreciated knowing when things went wrong for others, because they came to realise that it was not a personal failure, and that sometimes facilitator's also struck problems as observed during workshop sessions.

One person, referred to here as James had a counter experience to most, running against the general trend of the majority of participants who had comparatively low level digital information skills. He came along to learn, but found that in most respects he knew far more than the rest of the group in which he was participating. He was surprised at the lack of digital information skill shown by many others in his group. However, he said in the focus group that he found this was helpful because part of his job was to work in a support role. His participation in the project allowed him to gain new insights into the responses and attitudes of learners faced with using digital tools.

Some participants from each institution entered the project already very skilled at using social networking tools for communication, and these comprised, for example, blogs and email groups. The challenge for these participants was the reliance some of the lesser skilled persons had on their help during workshops. This led one of the more advanced online communicators, 3SS, to attend only part of some of the compulsory workshop sessions or to

attend optional sessions when less people were in attendance, just so her goals could be realized. However she was able to provide assistance quite effectively from a distance to a number of the participants through the use of Web 2.0 communication strategies, such as feedback on blogs and email forum discussion, her use of which was very efficient. Hence the variety of digital tools in use during the project enabled flexibility of communication and interaction for participants whether they had advanced or less advanced skills.

Certainly communication methods in the project were an important theme, and the variety of approaches in use was diverse across the institutions. One area which had been discussed by the researchers was whether the four groups should interact with each other. However, due to the disparate nature of starting times for the groups, and the cross-section of participants' starting digital information skills and time constraints for participants, the researchers decided not to complicate matters by introducing an extra variable or demand on participants' time into the project. The original plan was to enable an actual social networking process with a wider community for all the participants, something for which most of them were not prepared, and which the majority would (in the researchers' opinion) have found quite challenging.

From observations made by the researchers, participants in each of the groups appeared to need to familiarize themselves with participants in their immediate group first, in order to feel comfortable enough to develop and extend their digital information skills. Had the project had a longer timeframe, the extra dimension of introducing social networking communication strategies across the four groups would have been a natural next step. Two participants from Institution Four did access the blogs set up by Institution Three participants. One of them tried to interact and provided information, whereas the other lurked and followed a blog to which he referred while in the project.

An interesting example of communication involved a very cautious participant who moved during the project from lurking in a specialised Internet forum, to participation, with resultant offers of working with people internationally. He also went from only using email to setting up Google documents for a national group to use for collaborative purposes, after having sufficient practice to assure him self that it would work properly. This observation can partly be explained by the theme outlined in the next section, attitudes, because this is directly linked to levels of confidence (Phelps, 2002) and was observed in the project.

Attitudes

The theme surrounding attitudes has emerged from researchers' observations in the workshops and also from the written material which participants produced.

Initially, it was evident to the researchers that the workshops seemed to be composed of confident and not so confident participants. Those who appeared anxious, or who were a bit reluctant to try out the unknown, sometimes were critical of the tools or hesitated to try them, especially when there were perceived privacy implications. Participants in this category seemed to be quite concerned with ethical considerations, or issues that could arise in the use of the tools. For example, some participants at Institution Three were concerned about the publicness of using blogs, and had much discussion in the first workshop session about exposing their identities, and about writing their personal insights in such a public domain. As such they were reluctant, or slow to explore or adopt the tools, whereas others who appeared more confident to begin with, and adopted them with enthusiasm.

In each institution discussions during the workshops arose about privacy on the Internet and ethical issues surrounding intellectual property. Sometimes these were provoked by facilitator questions, but often they arose from quite deep concerns participants had about the consequences of exposing themselves in the public online arena or about others' stealing

their material. Participants in Institution Three were encouraged to set up blogs for recording their progress in the workshops and these were publicly available; some participants were very reluctant at the start, especially with regard to being identified. In some cases there were compromises such as using a title for the blog which could not be linked to their name, and in others the participants avoided the technology.

However, participants at Institution Three all moved beyond that stance with encouragement from the facilitators and their peers, and this led to some very worthwhile interactions between participants and researchers in the group. Also researchers observed that participants who started with a degree of low confidence in using open Internet practices were able, within a supportive environment, to move forward and break new ground with regard to digital information. In contrast, the seemingly more protected FaceBook group chosen by Institution Four for communication during the project, led to much less input and interaction between participants than expected. Although led by group members with prior Facebook experience, interactions in this medium did not thrive. While some expressed their disappointment at not receiving responses to their posts on Facebook, and took it no further, another was more pro-active and sought interactions with others by engaging with participants in Institution Three through their blogs. This attitude indicated perseverance which is a one of the characteristics of a high level of self-efficacy (Phelps, 2002).

The other aspect which led to a noticeable change in attitude was the sharing of material in an open domain. Many participants on entering the workshops were unfamiliar with the concept of collaborating to create materials for online use, and then sharing them openly with others. During the workshops they were introduced to the concept of using wikis for this purpose. Some participants really liked this approach, and decided to use a wiki platform to begin developing materials for their teaching. The attitude of these participants (to try out new skills and approaches) and their flexibility with regard to open platforms and sharing material, led them quickly into new possibilities for creating information which could be easily accessed by others. The new skills required for making use of wikis started with learning wikitext, and with getting familiar with designing material for web pages, and this was not always easy. Some participants once they had learned the skills, went on to use them in their work with colleagues and students, potentially taking their digital information literacy to a higher level and demonstrating application of knowledge (Anderson & Krathwohl, 2001; Bloom & Krathwohl, 1956).

Researchers observed differences between participants in learning new skills of this kind, and noted that better progress was made when participants were comfortable with making mistakes, compared to those who felt personally let down if something did not work immediately or consistently. Some participants verbalized their disappointment openly to researchers and peers during the course of the workshops, others did this during the discussion time set aside in the workshops, some also did this when they wrote in their reflections about the process, and others mentioned issues only in their writing. Some quietly worked on and only mentioned some of the issues they encountered later on in the focus group discussions.

Another area related to sharing and creating information which was embraced by participants in Institution Three was the use of photo sharing (Flickr.com) and video production using facilities and software such as Animoto.com and MovieMaker. Those participants with an attitude accepting of openness were observed to eagerly try out new tools and approaches and also posted their efforts to their blogs. Some participants were really interested in using digital images from their personal photo collections to compile presentations, and engaged enthusiastically with the process. As such it appeared to the researchers that the easiest way to encourage the use of new tools and strategies was when participants could readily see the relevance of them either in personal or professional contexts. As described in this section,

the influence of participants' attitudes in relation to the use of tools and strategies they encountered in the project was observed as being very important for the approaches they took to finding, using and creating digital information.

In the next section, the types of tools which participants explored are considered in more detail to illustrate the breadth of activity, and also to illustrate the similarities and differences across institutions.

Tools explored by participants

Participants during the project explored and used a broad range of tools and strategies associated with digital information. Some examples have been mentioned when describing themes associated with participants' digital information explorations. In the pre-survey and post-survey participants were asked about their use of a range of technologies, and also about their confidence in using them. The change in frequency of use and in confidence with web tools used to locate, retrieve, analyse or apply digital information across four institutions is illustrated in Figures 15 and 16 in a section further on. In Table 8, the diversity of technologies which participants made use of during the research project is listed. Information about use of specific tools was observed in the workshop sessions and mentioned in their record of learning. For example, some participants honed their skills in downloading images off digital cameras, and learned how to upload the images to web-based facilities such as Flickr.com where they could be stored and shared. Others went a step further and used digital images to create a digital story using Animoto. There were contrasting levels at which participants used technologies. Some were working at a relatively conservative level on entry into the project, others had already tried out a range of technologies and others were quite advanced in terms of computing knowledge and were familiar with programming language and approaches. There is more description about these aspects further on.

Table 8: The range of technologies used by participants in four institutions.

Tools
"$100" computer - e.g. ASUS
3D modelling e.g.; Google Sketchup
Blogs
Bliptv
Camtasia, Camstudio
Downloading images from digital camera
DVD creation
email
ePortfolio
FaceBook
Glogster
Google Earth
Google Analytics
Google documents, Google groups
Google Scholar
Interactive whiteboards
Linux
Microblogging, e.g., Twitter
OIL modules
Online photo manager e.g.; Flickr, Picasso
Online presentation tools e.g Animoto, Slideshare, Myplick PLE organiser e.g.; iGoogle
Presentation software e.g. PowerPoint
Podcasting
RSS feeds
Scanner use
Scratch
Search engines
Smartboards
Second Life
Social bookmarking, e.g. Delicious.com
Spreadsheets e.g Excel
Video editing e.g., Windows Movie maker
Video conferencing
Web authoring
Wiki – Wikieducator, Wetpaint, Wikispaces
YouTube

The following quotes from Jesse's blog posts for the project illustrate some of the trepidation she felt at first about using digital technologies per se:

> I wondered if I would find the time to put into digital learning as I am already stretched and my family already argues over whose turn is it to be on the computer. I was thinking how difficult would it be to use Animoto?
>
> I also started to feel worried as I may not have the time to do all the things I want....I feel like my original idea for coming into this project of setting up Blackboard was defunct...there is too many other things I could learn... I also felt a little nervous wondering if I would be able to master something even as simple as bookmarking.

The next quote demonstrates what happened after she used one of the tools, and discovered its potential; she wanted to explore further.

> I did get to learn Animoto and like X said it was great. I then became inspired to see if I could figure out movie maker (Jesse, blog post).

The next quote illustrates how, Jesse started to use the technologies and apply her new knowledge to her teaching practice.

> …followed through on social bookmarking. This was much more successful and I now have del.ici.ous set up on my desktop and have already found it advantageous already. I have moved sites I was saving into del.ici.ous that I want to use when I make a resource library for my students...I already was able to tell some students during the week about [a] site I had found. (Jesse, blog post.)
>
> In contrast, another participant who entered the project with advanced digital skills took the opportunity to extend his skills by exploring 3D modelling technologies. Notably his use of technological language is quite different and much more advanced compared to the previous participant's description.
>
> Having completed my first DIL goal in PHP, I've decided to tackle the apparently more visually rewarding job of exporting a simple polygon model from 3dsMax with Collada or some other conversion plugin which will be read by Papervision 2.0… (Robert, blog post).
>
> These sorts of customisable, biologically intelligent, or self developing applications is what I'm interested in. Accessible 3D graphics is going to play a part in their realisation, and that's what I'm going to attempt to create in DIL. A model of an object that may be difficult to conceptualize without the aid of 3D space, that can be rotated, and perhaps manipulated in other ways, such as exploded, to be made readily available for a student to use on blackboard. Here are some links to papervision examples. (Robert, blog post.)

This participant, as a result of the project, went on to create the 3D model and posted the following post on his blog with a link to the object he created:

> …Have loaded a complex model using the as3 geom exporter, which compiles the model information on export, embedding it with the flash swf, avoids parsing the file later on like collada. Also coded 3d camera movement around the object. I had the object rotating, but want later on to rotate the parts of the object separately. Had trouble finding examples of even camera movement around the object. It might take a moment to load, will build that in later….(Robert, blog post.)

As expected in a project like this, where participants demonstrated a broad range of digital skills and capability, their use of tools was quite diverse. The next examples, illustrate some of the disparate choices of technology which participants chose to work on during the project.

In the first example, Stewart was not very confident with digital technologies on entry to the project. He had some skills in word processing and used email before joining the project and he was inexperienced in the use of Web 2.0 technologies. He said, “I enrolled in the [name of institution] Word and I am going to do the Powerpoint one next semester” (Stewart, focus group interview). During the project Stewart joined Facebook, and set up a Google Reader and also subscribed to RSS feeds. He was unique in the group due to his need to subscribe twice to online services; one for practising and the other for using once he was confident in using the tool. He said:

> What I did was I have got two email accounts, I have got two Google reader things, I have got two i-docs and I have got two things so that I practice in one and then when I have got it right I go in to the other. I know that sounds a bit odd but it is just the way I – you know - because I am still a little bit fearful, it is all still a bit out there for me so I make sure I have got something down pat before I send anything to anybody or before I involve anybody else in it because I wouldn’t want anybody to be messed up by my inadequacy. I think I have got a bit of responsibility in that sense, you know, when I interact with others, to interact in a competent manner. (Stewart,focus group interview.)

In addition to using a range of Web 2.0 tools and approaches participants also investigated some online modules constructed as part of a national eCDF (eLearning Collaborative Development Fund) project, Online Information Literacy (OIL). Their use by participants during the project is discussed next.

Customisable modules – Online Information Literacy (OIL)

Some of the project team had been involved with the development of these modules in a previous project (http://oil.otago.ac.nz), and were keen to see them undergo further evaluation and use. The accessing and use of the modules by participants in the project emphasises how important it is for users to have access to relevant information as they need it. In this research people were encouraged to engage in self-directed learning and choose information relevant for their contexts.

In all the research groups, attention was drawn to the modules’ existence and an example was shown. Where there was perceived relevance for participants there was a very favourable response in that participants engaged with the resource. For example, two people who had expressed concerns about writing for academic purposes gave the Essay Writing module attention. One participant’s comment in the focus group interview demonstrates how the discovery helped others because it was shared; an important aspect of DIL which will be discussed further on:

> I referred someone to the Oil modules. I referred my lecturer to them because we were a group of postgraduate students and a lot of them were scientists and very few of them knew how to actually structure an essay so I sent a connection on to my lecturer who passed it on to a few people who expressed their appreciation Institution Four).

> Another person was using the Annotated Bibliography module for her teaching, and as part of her workshop goals and activity revisited and discussed feedback from students from the previous year. When considering the feedback it became apparent

how limited was the perspective of a naïve user. She discovered that students will not necessarily find material which is organised in non-linear formats even when it is clearly indexed and what they are looking for, on a website with which they are familiar or have been told to use. The module was used again successfully, for teaching purposes, by the project participant and others in her organisation, once the participant was shown how it could be found more easily by using better search techniques.

Naia also used the OIL modules as she wanted to get advanced search skills when looking for information for assignments. She worked through the modules on searching and evaluating information gained. In her written reflection for the action learning cycle she wrote:

> Great skills to have when studying as the Internet is a sources of information, Find good tips from the oil Modules- it is great. (Naia, Written reflection.)

Bernard worked through several aspects of the modules and recorded what he was doing in his reflections about two of the modules. He wrote the following:

> My reflections of Annotated Bibliography: A module that allows my fellow student /class friends to benefit by knowing how to approach a topic, organize information, search for sources, evaluate sources, and write bibliography. Note taking: Then there are note-taking skills that can be learnt off OIL and the reasons why note-taking is important : record new data, summarise, record ideas, communicate to others, show relationships, create revision notes, plan, and for recall. Then they explain range, techniques and special notes. Reading skills too: skimming and scanning, read in-depth. Memory techniques such as mind mapping, flashcards, and mnemonics.
>
> Research methods: One way of getting information for a report is through surveys or questionnaires. This can be done through: telephone interviews, face-to-face interviews, asking people to fill out a form. In order to limit the range of answers from surveys or questionnaires it is a good idea to restrict your questions to relevant and distinct closed questions. This makes it easier for you to quantify the data you receive from your survey.
>
> My reflections of the essay writing module: Firstly the module lets the user understand how to approach the topic given then to collate the information provided, to develop your argument and incorporate your research into the final written essay. It suggests you look closely at your essay topic and the information your tutor has provided. It is very helpful in that the module has little exercises that you would click on words and immediately you are given answers to what words mean. This module is very good, it is simple, and it has easy to follow instructions with one click arrows and answers.

The OIL modules could be customised but none of the participants found it necessary to go down this route during the project.

In the next section, the ways in which participants made use of technologies to create their personal online learning environments or spaces is described, along with the influence of belonging to a social networked community.

4.4 Personal online learning environments and the social networked community

In this section Research Question Two is addressed: Ascertain how personal online learning environments and membership in a social networked community can influence digital information literacy

Personal learning environments[2] (PLEs) and membership of a social networked community is associated with online approaches and affiliations, and this was previously outlined in the literature review. Therefore a PLE is assumed to be an online learning space which a user sets up, and as a result people often become part of a social networked community on the web. A simple example is the space a user may organise on YouTube, a video-sharing website. Once a username and password is set up, the user can access videos, upload their own material, share videos and comment on them, and subscribe to the videos of other users. Contacts with other users are made and messages can be sent to users, and a group of friends can be organised. Facebook is primarily an example of a social networked community, however many people use it as a PLE as well, storing photos and video on their pages. Many participants in the project were already users on Facebook and accessed YouTube videos, however only a minority were aware of the potential of sites such as YouTube for setting up personal spaces and networking.

Interestingly, findings from the project indicate that membership in a social networked community was only one aspect of building literacy in digital information, and the researchers will argue in the Discussion section that social networking and personal learning environments are not always digital and either type can influence digital information literacy.

What follows in this section, is primarily a description of what was observed by researchers about online approaches, and was discussed with participants in focus group interviews. Some general observations about the development of community in the face-to-face environment and non-digital PLEs will also be mentioned. In the researchers' experience from this project, although strength of community was evident, to varying degrees, in the groups that developed within the institutions, it was not predominantly online for the majority of participants. The design of the project encouraged conversations and connections to occur in both face-to-face workshops, and also via online tools which participants used in the project, e.g., blogs, email forum, Facebook.

In one institution, some individual sessions were run because participants could not attend all the scheduled workshops, and also because of their lack of confidence with digital tools, they required extra assistance. One of those participants doubted whether she would have got underway without initial one-to-one support, although she later appeared to enjoy the group interaction in the workshops. Access to Web 2.0 tools was problematic for one institution thus limiting options for participants, because although they could access technologies at the workshops, they could not access YouTube or Delicious.com from their desktops, so that did limit their options. To fully engage with the concept of a PLE and interact in a social networked community, participants needed to have unlimited access to technologies at any time.

2

In the ensuing sections, a description of the way in which participants set up and used personal learning environments and engaged in a social networked community is presented.

Personal learning environments

When asked about their Personal learning Environments (PLEs) in the focus group interviews many participants were puzzled because the term was not familiar to them as it may not have been emphasized in the workshops. However they were able to respond once they were asked how they organized and kept track of what they were learning. Also when examples were provided they could then usually supply instances from their project experiences. Some of the prompts included the use of social bookmarking sites (e.g. Delicious.com), blogs, RSS feeds and Readers, and other Web tools.

One participant in particular was quite advanced in setting up a PLE for herself, and she engaged in considerable reflection on her blog around what constituted a PLE in her experience. Figure 10 illustrates her PLE in 2008, and illustrates the multiple tools of which it was comprised.

Figure 10: Personal Learning Environment (PLE) for Sarah in 2008.

Sarah concluded that her PLE was like her cookie baking. The image she provided showed a tray of cookies which had merged with each other to varying degrees. (Sarah, blog post). She then developed a diagram (Figure 10) which showed her PLE as encompassing "all the tools I use for gathering and processing information, communicating and collaborating, learning , reflecting and publishing" (Sarah, blog post). She explained:

> the hub of my PLN[3] is this blog, alongside my ePortfolio. I chart my activities, learning and reflections in this blog and then gather them up in my ePortfolio for display. Ultimately my blog is the most important aspect of my PLN which is why I have made it bigger than my ePortfolio in the diagram (Sarah, blog post).

[3] The participant in this quote only, used the abbreviation PLN which stands for Personal Learning Network.

As can be seen in Figure 10, above the PLE diagram she has written: “To learn is to practice and reflect” attributed to Downes, and below the diagram is the phrase, “Self controlled life-long learning”. The participant received feedback on her PLE diagram from people outside the project, one of whom had expected active links on her diagram. The participant then explained that under Delicious.com links found on her blog page it was possible to find all the web sites she had tagged under PLE and ple. This illustrates the power of connection which those like Sarah are engaging in on an everyday basis. Sarah said in a workshop session that it had taken about a year of persistent work to get her to the stage where she was now, with a well read and sometimes controversial blog, accessed internationally, and a very wide range of contacts expanding now through other forums including Twitter and Second Life.

In contrast, for another participant who had very little web experience prior to the project, the experience of setting up a PLE was quite different, and what shone through was her enthusiasm as she first started to organise her online links. The following quotes are taken from her written reflections about her experience in the project:

> Workshop 4 was an amazing experience for me. I was fascinated by the information X had to share. It was all new to me, about aspects of the Internet that I had never explored and knew very little, if anything, about. (Mary, Journal reflection.)
>
> I now have a reader account and a subscription to my health magazine. This is so much better than the email magazine. It is already open for me and it is so quick to access. All the advertising has also disappeared which is an extra bonus. I also have a news subscription and a subscription to my friend's “shared” site. (Mary, Journal reflection.)
>
> I used this to explore blogs written by people who share my interest in ice figure skating. I found that quite fascinating. (Mary, Journal reflection.)

Another participant’s reflection illustrated how her PLE had shaped up, and how networking was helping her develop her digital information literacy:

> I try to keep up with everyone else's blogs once a week or so - which has been a great way of feeling still involved, even if they're working on something that I don't intend to follow up. And I realise I've learnt so much abo1`ut web tools and ways of working that I never would have made time to find out for myself. So my potential 'tool box' has gotten MUCH larger - it's like everyone else has been buying fancy kitchen equipment for my cupboard and showing/telling me what it's for - I may not want to use it just yet, but if I ever get around to doing a really fancy dinner.....(Helen, blog post.)

Although a PLE for the purpose of this project was regarded as digital, some participants in the focus group discussions, and also in the workshop sessions stated an alternative view as they were recording their learning in a non-digital format. Although this was not the intention of the researchers as they were attempting to support the development of digital skills, it posed an interesting dilemma which will be discussed further on in the report in the Discussion chapter.

Socially networked community

Participants were introduced to Web 2.0 tools and strategies in the workshops so they could use open online resources to support progress towards their goals for becoming more digitally capable. For example, participants were not only shown how to set up a RSS feed using Bloglines, or Google Reader so they could have a constant stream of information subscribed

to their web space, they were also shown how to make use of communities of users to access information. For example, using Delicious.com as a search tool when looking for resources on a specific topic as opposed to the World Wide Web, helped to make searching more focussed for participants. These systems were explained to participants as something which could save time, and thus help them to become more efficient at seeking and managing information.

Although some participants were familiar with social Internet sites such as Facebook, others such as Mary were very new to them. Mary expressed the following in her written reflection about the project:

> During the discussion it became increasingly evident that there was a great deal more about using a computer than I had ever imagined. I had never heard of things like Twitter, Bebo and Facebook. In a way I felt a bit overwhelmed by just how much I do not know.

As well as the conversations and focussed discussions which people had in the workshops, participants in Institution One and Three were also encouraged to have online interactions in between sessions. With some notable exceptions, described below, that did not happen as much as expected. In general, people in these two institutions accessed both the personal support of the workshop sessions, and also online support between face-to-face workshops which was provided by facilitators or peers in the project. Additionally some participants also accessed online networks outside the environs of the project. In some situations this was facilitated by the researchers and in others, the participants sought their own networks.

Two participants at one institution who sought and used online support from external agencies were people who had advanced skills and confidence on entry to the project. They were seeking information of a nature which went beyond what was readily available within the group. One had built up extensive online contacts through a personal blog developed prior to the project. The other participant after getting some face to face help with open source operating system software (Linux), also made use of online forums associated with the software. These participants were not as reliant on face-to-face help, and attended less often as time went on. In one case, the time spent in helping others when attending the workshops, caused the participant's own work to suffer (Sarah, blog post). Another participant (Stewart) had a major breakthrough early in the project. He had lurked in professional online forums previously, and was working in a very specialised field. He gained the courage to contribute whilst in the project, and this led to very positive responses from other professionals and influenced his future study and work directions.

While professional online contacts did not always blossom for participants, the discovery of web resources to prompt and support learning was often reported. For example, in the focus group interviews, the use of instructional tools associated with specific applications were often mentioned.

> Oh I was always a techno dinosaur. In fact I took great pleasure in being one but I realised that that in itself is a limitation to learning and that when you need to know something, there is always somewhere you can go to find out what you need to know and yeah, the videos that the people put out and everything were really quite good, particularly about the RSS feeds, they were really good. (Stewart, focus group interview.)

Mostly when participants tried out new web tools this was favourable, and all researchers reported that participants were enthusiastic and engaged during the workshops as part of a process of learning new skills and solving digital problems. It was evident to the researchers that when participants were not clear about how to approach an unfamiliar aspect of

technology, they turned to those around them for help. The following case in Table 9, illustrates how participants at Institution One were often *bubbling over* during the course of the project, and also the strength of peer support observed by the researcher there.

Table 9: A case illustrating how workshops operated at Institution One.

At Institution One, the workshops had three distinct sections. Each one started with a verbal report from each participant on their progress during the week and their objectives for the coming week. This part became progressively longer as participants offered more feedback and suggestions to the researcher. Reporting also took longer as people took more and more pleasure in sharing their achievements and successes. It was also very common for them to express their relief at being able to share some of the problems and frustrations they had been experiencing. A phrase, coined by one of the participants, "there's always Friday" (the day of the workshop) was reported as being used weekly by at least one person. Whenever someone felt at their wits end during the week, they repeated this mantra to them self knowing that someone in the project group would be able and willing to help. The next stage of the workshop was for discussions. These mostly arose spontaneously from issues raised in the reports. Examples of discussions include: Safety and security online; the validity of online sources such as Wikipedia versus the peer-review process; the nature of truth and reality and using work time and computers to access social sites such as Facebook. In the last part of the workshop people worked on their own projects or helped others. Often this would involve someone demonstrating a new tool, technique or piece of equipment to the group or part of the group. Everyone in the group used a blog for their weekly reflections and while most people read the blogs of others, few comments were posted on them. Most communication between workshops was conducted using Google Group email (almost 300 mails were sent over the course of the workshops).

Participants at Institutions Two and Three also began each session by sharing progress, prior to exploring a particular topic in which participants were interested. For example, they shared information about wikis, Smart Boards, digital video, digital audio, social bookmarking, blogging, copyright, and security. Then the rest of each workshop session was devoted to participants working together or singly on their own topic or project of choice.

All researchers report that most participants valued the face-to-face nature of the workshops as an aid to their learning. Whereas participants at Institution One and Three made good use of blogs and an email forum for communicating with each other in between workshops, at Institutions Two and Four neither blogs, email groups or other virtual social constructive approaches were utilized to any extent.

As reported by the researcher for Institution Two, participants there were happy to participate and share while in the session, students taught teachers several aspects about technology and the group learned well from each other. They were prepared to take risks with others, in the presence of others. They tried things after being shown them and helped each other to come to grips with them. A great deal of sharing happened in the sessions – sharing what they had done in the time between, sharing of expertise with the topic of the day, sharing blog set up skills, sharing video making skills particularly. However, their understandings were more likely to be shared with the group verbally than on their blogs.

Along with the sharing experiences when using a range of digital tools which was a positive aspect of the project, it was noted during the workshops at one institution that, there were some areas of frustration. For example, for participants who were new to open online tools, the process of registering on websites, so they could use the facilities was not always a smooth process, and there were some instances where participants mislaid or forgot their login details. This prevented them from accessing the blogs they had started, or other sites they had previously registered on and wanted to use, and this led to delays in progress and often blame was laid with either the technology or with themselves. Facilitators or other participants, when on hand either during the workshops or via online means of communication, were able to cajole the participants to keep trying, and they were also able to offer suggestions for managing situations as they arose. This illustrates the importance of social contact during the research process.

Whether using social networks for communication or for assistance, the emphasis is on sharing information; therefore, there is an expectation that there will be two-way communication and exchange of information. However, people need to learn how to share information appropriately. To network effectively users need to have the ability and confidence not only to join, but also to interact appropriately in the community. Weinberg (2008) claims that the virtual relationships which people have in social networks require the same attention to courtesy as a "real relationship (p.. 1). Therefore it was pleasing to see how relationships developed in the groups as a result of their interactions. Two participants mentioned how useful they found working in the groups.

> I was still left with the question of what to do. Therefore, the active approach the group took by starting to research different areas really suited me as I did not know where to start. (Maria, blog post.)
>
> After all the feedback I got from you guys on my website I did some more work (Maria, Researcher workshop notes).
>
> Unfortunately it is time to think about winding up. Jess left the group and it is sad to see the end in view but she increased my knowledge which I appreciate and I hope all who have come & gone realise that each has enriched each other by sharing. Often one has no set agenda but like this week someone shares their achievement and you are on another learning curve. (Vera, blog post.)

Also, it was encouraging in terms of digital information skill development that as the project went on, participants became more resourceful and able to solve their own problems. As this was a step towards gaining autonomy for interacting in the online environment. One person who gained a large measure of confidence during the project described in the focus group interview how her viewpoint about technology had changed.

> You don't look at it and think you can break it or break the world now. I am much more able to try something before I run for help. In other words, whereas initially I just looked and anything new I yelled help, now I don't ask for help until I know I have tried all manner of things and I am really, really stuck and that's a huge growth thing for me. (Mary, focus group interview.)

Evidence gathered during the project demonstrated, that as well as making use of the opportunity which attending the workshops provided for participants to work alongside others as they developed their digital information skills, there were ample opportunities for participants to extend themselves and use online tools and strategies for interacting with others. In some cases participants did not want the project to end and planned to maintain links with each other. The comments from several participants during focus group interviews about the benefits of being in a group learning situation, give far greater importance to the

face-to-face workshop interactions and contacts than they do to the online environment, although participants were cognizant of the wealth of resources and possible contacts the Internet brings to people regardless of location. While working in a group situation was observed by the researchers, and stated by participants as important for gaining digital information skills, the researchers are not able to say unreservedly whether each group evolved into a social networked community although they did develop many characteristics of a learning community, as they worked autonomously in a collaborative manner and were committed to a shared process (Wilson & Ryder, 1996).

The way in which participation in the project influenced participants' digital information skills is outlined in the next section.

4.5 How participation in the project influenced digital information literacy (DIL)

In this section, the changes which participants demonstrated during the course of the project in relation to digital information literacy are described. Participation in the project definitely influenced how participants rated their skill level in the use of digital technologies by the end of the project. Findings from the pre-survey (Figure 7) about traditional and digital skills for using information which are explained in the section on digital information literacy skills on entry, were compared with responses in the post-survey at the end of the project.

The section is set out as follows:

- Overall digital information literacy scores;
- Use and confidence for digital information tools;
- Overall confidence (using computer-based and Internet-based communication and information methods);
- Summary of changes to digital information literacy (DIL).

Comparison of pre and post-survey responses for information literacy – traditional and digital

Participants taking the post-survey were again asked to rate their use of digital versus traditional information skills, to locate, retrieve, analyse and apply information relevant to their study and work. In Figure 11, it can be seen that those who rated themselves at high and very high for digital technologies in the post-survey did rise compared to the pre-survey (Figure 12), below). Interestingly, the number of participants who rated themselves as having high or very high traditional information skills also increased in the post-survey.

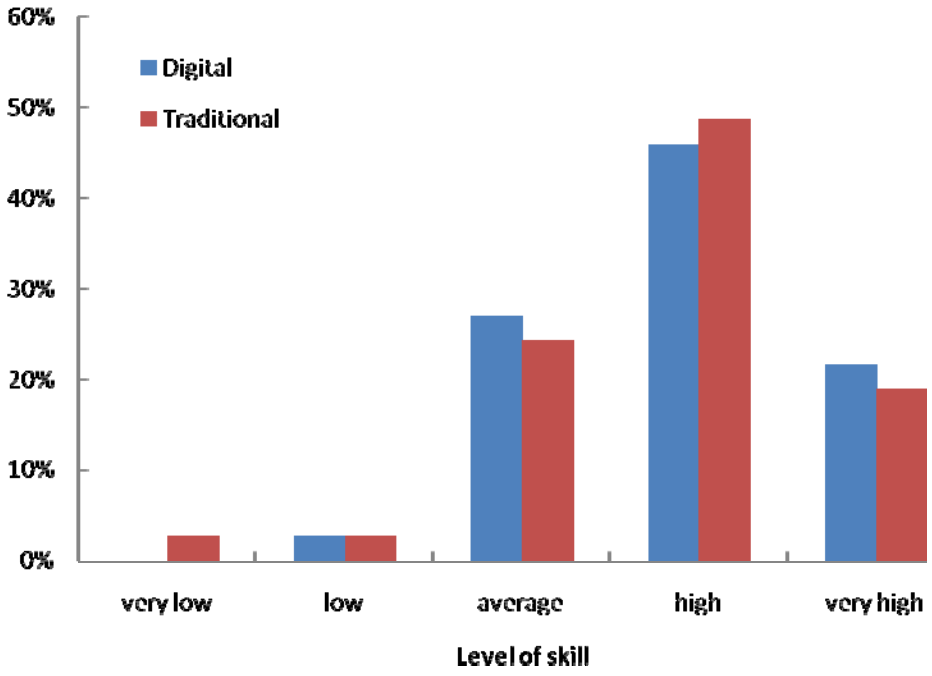


Figure 11: Post-survey digital and traditional skill ratings for all participants (n = 37).

A comparison of the pre-survey and post-survey graphs side by side in Figure 12 makes this increase in digital skills on exit from the project clearer to see.

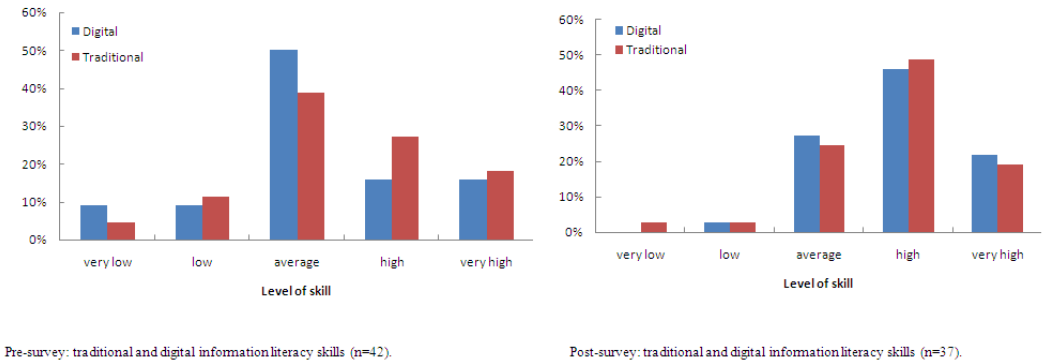


Figure 12: Comparison of the pre-survey and post-survey ratings for digital and traditional information skills.

In Figure 13, the overall increases made in both traditional and digital information skills by participants across the four institutions are shown. Overall 20 participants increased their digital information skills. Interestingly, participants in Institution Three reported a greater increase in their traditional information skills than in digital skills.

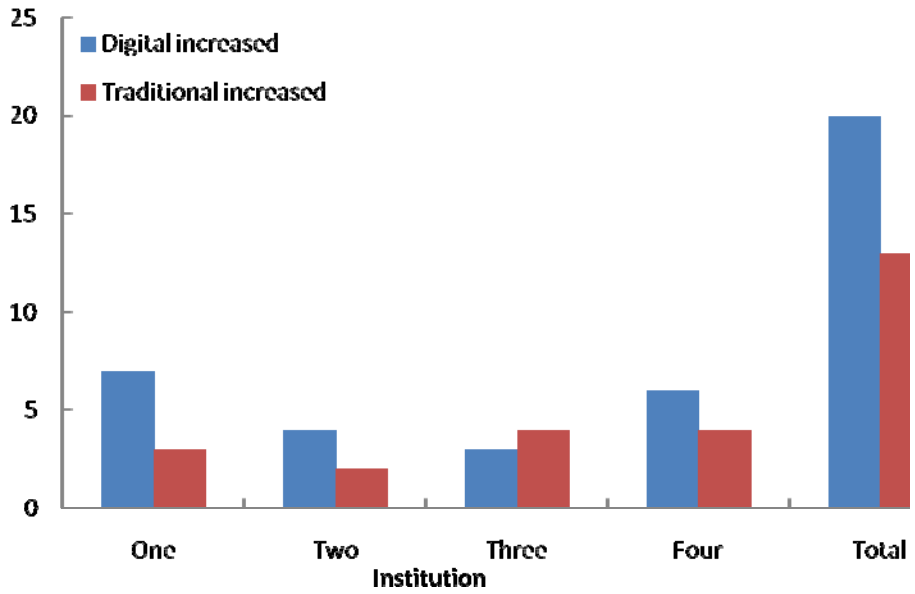


Figure 13: Overall increases in digital and traditional information skills at the end of the project.

Participants' rating of their traditional and digital skills, in the previous section, related to their perceptions of how well they were able to locate, retrieve, analyse and apply information relevant to their study or work when using either libraries in a traditional way or when using digital or electronic technology. This was just one aspect of digital information literacy. A comparison of pre-survey and post-survey responses included the calculation of comprehensive overall digital information literacy scores for each individual. This calculation entailed the scoring of responses to questions in the surveys related to:

- Use of digital information tools;
- Confidence in using a range of digital information tools;
- Self-efficacy in the use of computer-based and Internet-based communication and information methods – this included:
    - Personal feelings - worry abut making mistakes, ease of learning, anxiety etc.;
    - Confidence in the use of methods - web-based, computer applications etc.;
    - Approach to learning a new technology - instruction manual, support etc.;
    - Personal characteristics - perseverance, attitudes, support etc;
- Overall confidence.

It is worth noting that individual scores for self-efficacy have been included in the total DIL score for each participant, therefore they will not be presented separately in this report. It would be interesting to make comparisons but it is beyond the scope of the present project.

Questions used in the pre and post-surveys can be viewed in full in the Appendices. The calculation of responses to these elements resulted in an overall digital information literacy score for each participant. The significance of the findings are reported next.

Overall digital information literacy scores

A comparison of participants' DIL scores (when combined, as explained above) across each of the four institutions at the beginning (pre-survey) and end (post-survey) of the project are illustrated in Figure 14 below. For all institutions, participants' overall digital information literacy scores were higher at the end of the project. Institution One's post-survey scores show the most marked increase compared to pre-survey scores.

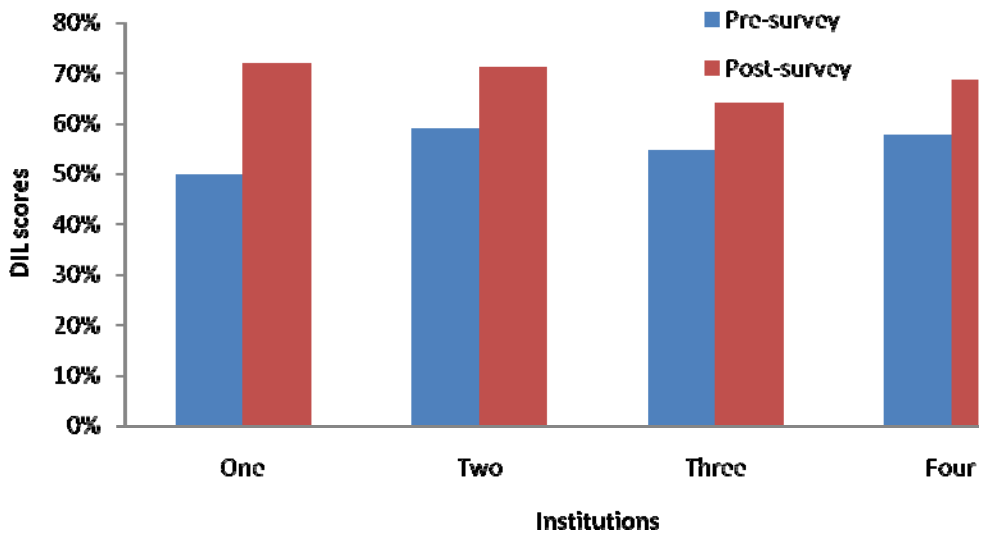


Figure 14: Overall Digital Information Literacy scores as percentages calculated from the pre and post-surveys .

The calculation of means and ranges for the digital information literacy overall scores was done as part of a comprehensive analysis of the pre-survey and post-survey responses. The results gave a further indication of the changes that occurred in participants' responses at each institution overall. All four institutions demonstrate an increased mean for digital information literacy (DIL) scores by the end of the project (Table 10). The ranges indicate the intra-group spread of participant digital information literacy. Of particular note is the lifting of the lowest figures in this range for each institution from pre-survey to post-survey.

Table 10: DIL pre and post-survey scores – means and ranges – for each institution.

Institution	**Pre- survey**		**Post- survey**	
	Mean	**Range**	**Mean**	**Range**
One	52.65	37.94-70.88	72.46	57.06-91.18
Two	58.28	42.94-77.94	72.00	55.00-84.12
Three	58.21	30.59-93.24	64.35	47.06-92.35
Four	59.58	38.24-85.29	68.57	44.71-86.47

As illustrated in Figure 15, three of the four institutions showed similar degrees of change in the mean DIL score, whereas Institution One showed the greatest change. The increases ranged from 23% to 48%, and it is worth noting that the mean increase for Institution One was almost double that of the other three institutions. According to the researcher at Institution One, this was a tight-knit coherent group with a strong desire to share and help each other.

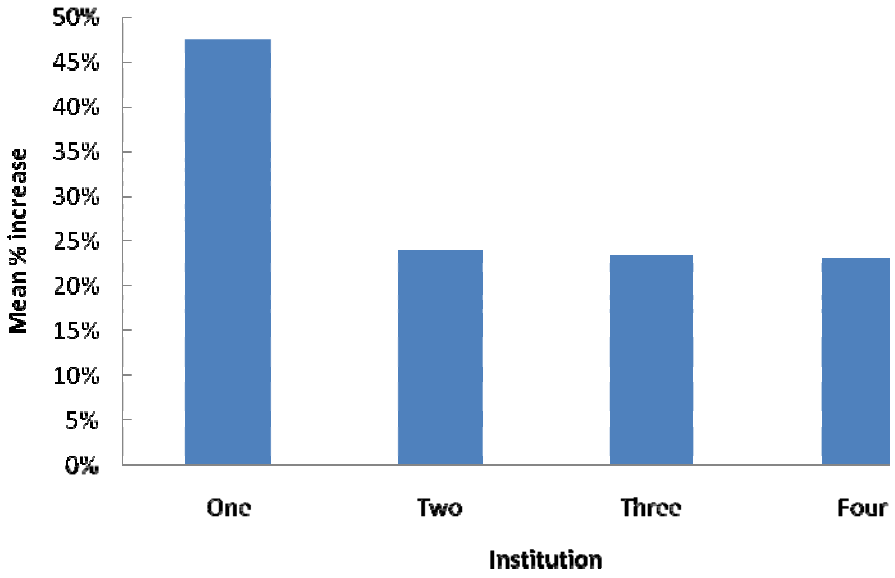


Figure 15: Mean % increase in DIL scores for each institution at the end of the project.

The positive shifts in digital information literacy scores demonstrated in Table 10 and Figure 15 also align to increased changes in overall confidence for all institutions. When overall digital information literacy scores were examined for individuals at each institution, a general trend was observed. It is evident that the majority of participants had an increased DIL score at the end of the project, that is, 95% gained a higher level of digital information literacy by participating in the project. This finding is significant.

As well as overall DIL scores being calculated from pre-survey and post-survey responses, the use of digital information tools and participant's confidence with them was examined. An explanation of the findings from this calculation process follows.

Use and confidence for digital information tools

The digital information tools calculation was done by looking at the differences in individual scores (pre and post-survey) for frequency and confidence in the use of use of a range of digital (including web) tools for locating, retrieving, analysing or applying digital information. Once these were calculated, they were then collated for each of the four institutions; these scores were considered to be a component of DIL[4]. As could be expected, confidence with digital tools tended to develop along with frequency of use.

Looking at Figure 16, the tools, in order from highest to least, showing the largest shifts ($\geq$ 50%) in use across all institutions were blogs, web feeds, social bookmarking, file sharing, web conferencing and photo sharing. The shift was greatest for the use of blogs particularly for Institutions One and Two whose participants had used blogs for the first time during the project. However, as expected, because blogs were not used during the project by its participants, Institution Four showed the least change in use for this tool. Changes in confidence levels ($\geq$ 40%) were highest for blogs, web conferencing and social bookmarking, respectively.

[4] For each individual the difference between pre and post-survey scores, on the Likert Scale, was calculated, then these differences were totalled for each web tool to provide institutional totals.

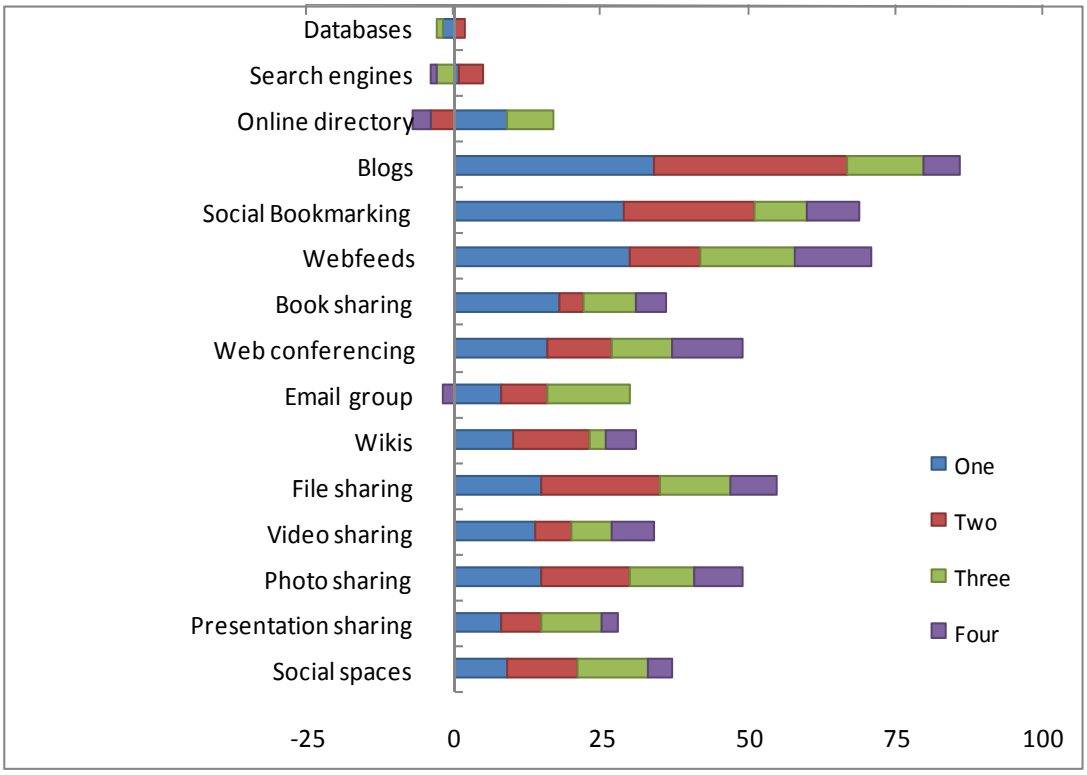


Figure 16: Change in frequency of use of web tools used to locate, retrieve, analyse or apply digital information across four institutions.

In Figure 17, changes which participants made in their levels of confidence when using web tools is shown.

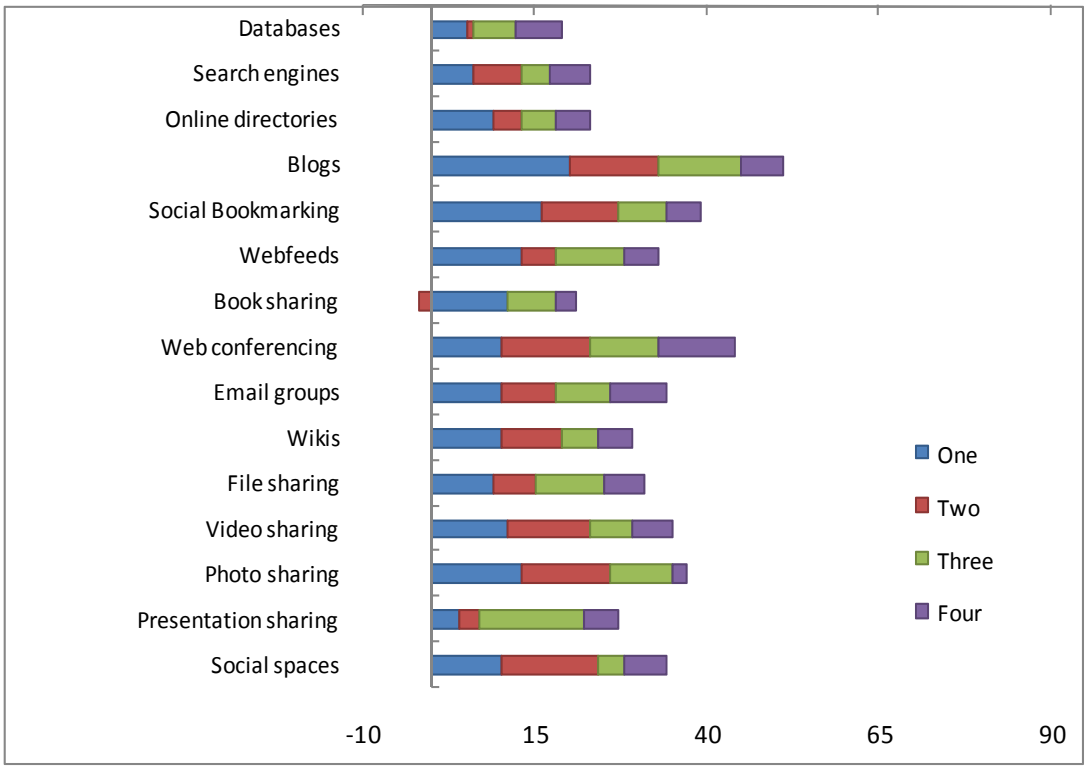


Figure 17: Change in confidence in use of web tools used to locate, retrieve, analyse or apply digital information across four institutions.

The pre and post-survey data revealed that confidence in the use of web tools for locating, retrieving, analysing or applying digital information increased in all areas (except book sharing for one institution). The most marked increases were in blogs, which were used for recording reflections by three of the four institutions in particular, web conferencing, social bookmarking and photo sharing. Institution two participants show the least overall confidence change and Institution One, the greatest.

The increased frequency of use of web tools for using information generally matches the increased confidence in most aspects measured, but is most matched in perceived confidence in aspects such as the use of databases, search engines, and online directories. Conversely, although frequency of use increased in aspects such as blogs, social bookmarking and file sharing, these areas were not matched by such a significant shift in confidence.

Along with evidence of increased frequency and confidence in the use of a range of Web 2.0 (digital) tools by the end of the project, participants' ratings of their overall confidence in using computer-based and Internet-based communication and information methods is also reported.

Overall confidence (using computer-based and Internet-based communication and information methods)

The mean overall confidence rating which participants gave themselves in the pre and post-surveys, were for using computer-based and Internet-based communication and information methods (Table 11). When this confidence rating was collated across institutions, it also added to the picture of change demonstrated by the previous project findings about Web 2.0 tools for seeking and using information. Overall confidence across all institutions changed from a mean score of 3.3 to 4.0.

Table 11: Overall confidence (mean score) in using computer-based and Internet-based communication and information methods – pre and post-survey.

Pre-survey								
Use of computer–based and Internet based communication and information. (n=42)				**% Frequency of Responses on five-point Likert Scale**				
Overall confidence	Mean	Median	Mode	1	2	3	4	5
	3.3	**4**	**4**	7	16	23	42	12
Post-survey								
Use of computer–based and Internet based communication and information. (n=37)				**% Frequency of Responses on five-point Likert Scale**				
Overall confidence	**Mean**	**Median**	**Mode**	1	2	3	4	5
	4.0	**4**	**4**	0	6	14	56	25

The findings described so far in this chapter in relation to changes in digital information literacy (DIL) scores are summarised next. Cases which illustrate the variety of ways in which participants shifted their digital information literacy skills and capability as a result of taking part in the action research project can be found in Chapter Five.

Summary of changes to DIL

Participants in all four institutions demonstrated an increase in digital information skills. Participants overall digital information literacy scores, which were calculated from multiple elements, in all institutions were higher at the end of the project. Institution Three participants showed more of an increase in traditional information skills than in digital skills for accessing and using information relevant to their study and work. The increases in DIL ranged from 23% to 48%, with the mean increase for Institution One the highest.

A calculation of the frequency of use of web tools for accessing and using information in each of the institutions demonstrated the greatest shifts for blogs, web feeds, social bookmarking, file sharing, web conferencing and photo sharing. Whereas the changes found in confidence levels were highest for blogs, web conferencing and social bookmarking, respectively. The mean overall confidence rating for using computer-based and Internet-based communication and information methods changed from a mean score of 3.3 to one of 4.0.

In the next section, the importance of digital information literacy for lifelong learning as demonstrated by participants during the project, is described, followed by a look at where the findings for this project are situated with regard to the OECD.

4.6 Digital information literacy for lifelong learning

In this section Research Question Three is addressed: Indicate how important digital information literacy is for lifelong learning of staff and students (including Maori and Pasifika), productivity and innovation.

An analysis of the data (blogs, focus groups and surveys) produced four major ways in which the increased digital information skills of the participants affected their life-long learning, productivity and innovation. The advances participants made in developing their digital information literacy have changed the way they work, greatly increased their motivation and confidence for future learning, changed the way they learn and set them a journey of development and re-development for the future. This section is organised into the following topics:

- New ways of working: more creative teaching; more productive work; advocating for changes to professions;
- Changing the way they learn: changing learning behaviours; personal growth and attitude shifts; give it time;
- Future proofing: an ongoing process and preparing for the future; another language for communicating; engaging in communities and connectivity; blurring the boundaries between work and play; the human element;
- The drive to continue: the addictive effect; growing confidence; commitment to future development and growth.

New ways of working

The most frequent comments regarding new DIL skills related to how it had changed the way they worked. While many referred to improved efficiency or effectiveness (productivity), the biggest changes involved new ways of working (innovation) which were creative.

More Creative Teaching

Most of those who worked were involved in teaching or working with students in some capacity. Three themes emerged from the change in their work in relation to students: *Diverse Learning Environments* - enriching the students' learning experience using digital technology; *Interacting with Students* - the adoption of alternative ways of engaging or interacting with their students; *Developing Students' Digital Information Literacy* - helping students with their own development, particularly in relation to using digital information.

Diverse Learning Environments

When introduced to tools such as wikis, Moviemaker, Photo Story and future aims teachers realised the potential of these to create a range of different learning experiences for their students. They were able to use multiple representations of information using audio, animations, colour and images to enrich the usual text based lessons. These allowed them to more actively engage students in the learning process. For example Marilyn was able to use technology to explore with her students our multicultural heritage in a way that was not really viable via non-digital means. Tammy found Smart Boards were "…a good way to engage students in the content of a lecture. The boards have a WOW factor, and enable students to actively participate in learning by using the board" (Action research cycle).

Colleen says "…I see all the potential for the classroom". She goes on to give the example of "getting children's writing up and being able to directly annotate by interactive whiteboards…I've got a richness of resources that I can tap into at any time" (Researcher notes). For some teachers learning to use more basic tools such as Powerpoint were important first steps to changing their teaching approaches.

Liza provided a good example of a teacher using a range of digital media to enhance learning:

> I have broadband at home. I found that this became a must to enable me to work at home on the newly encountered ideas. Now a whole new world has opened up to me as I have downloaded 'Audacity' for recording and editing sounds and downloaded Skype and talked with someone on the other side of the world (a very exciting AND strange sensation). I have been thinking about future possibilities for 'video conferencing' as a way of providing on-going support to students, especially those that may be struggling (Liza, blog post).

Therefore exposure to a broad range of learning opportunities, positioned many participants to extend their approaches to digital information.

Interacting with Students

Finding new tools to interact or engage with students was also frequently mentioned. These often increase both the quality and frequency of the interaction. Helen, who worked with students with disabilities, developed a Google Document site giving particular attention to accessibility. This continues to make a great difference to her students. On her blog she posted that it was a work in progress as she continued to learn more about accessibility on the web. Carol mentioned on her blog that she considered getting her students to use blogs rather than written journals Tammy was working towards using Wimba to communicate with

distance students. She said, “Talking live to a student will be great, but being able to demonstrate a search to them will be even better!” (Action research cycle.)

Trisha felt it was important to engage with students at their level of technology, and said, “ … feel strongly about delivery in our environment to these computer savvy students, also to students who have such literacy problems” (blog post post). She introduced Youtube, smartboards, wikis and blogs into her teaching. Melissa became more aware of the possibilities and was also concerned that her students did not miss out: “I am more aware of the specialised knowledge available to create some great projects. I feel very inspired.” (blog post post.) Rita dealt with large numbers of first year students. After exploring a number of options, she set up a Facebook site to stay in close contact with these students (blog post post).

The new skills which participants gathered during the project were very applicable to their work with students and would be of ongoing usefulness.

Developing Students’ Digital Information Literacy

As teachers improved their digital information skills they also saw the potential to develop the digital information literacy of their students by sharing their new skills. However, they also recognised the need to develop critical and evaluative skills in their students and felt better equipped to do this after participating in the research workshops. Sharon worried that young people need more critical skills to distinguish between reality and fantasy which she described as being “all jumbled up online” (focus group interview). She felt that traditional education did not equip them to deal with the persuasive power of online media. Victoria shared this concern: “Asking questions and evaluating, generating and examining evidence of outcomes about digital tools needs to become mandatory to foster sustainability for the long term”. She felt that without evaluative skills “The few good quality results will become buried in a morass of mediocracy” (Victoria, blog post post).

James, a librarian, also expressed concern that while young people were often more familiar with digital tools, they lacked the critical skills, inherent in information literacy, to evaluate the overwhelming mass of information they were exposed to. He said, “…younger people are growing up with a lot of tools that we didn’t grow up with … they have more computer literacy… [but].. they are less able to find the right information”. He mentioned the reliance on Google and Wikipedia and was concerned with teaching them to move beyond the first-up results. His goal had become one of using online tools and his own tutoring skills to facilitate a more rounded development of the life long learning of his students, and said:

> I found it very valuable to experience how do we pass on information about the digital world, about the Web 2.0 tools because I do think we take it for granted that people know this and that students have a very good knowledge of computers but that may not necessarily be the case, and [for them] it is just time to play. I think that’ s the biggest thing with digital information literacy, is just playing, it is not guided or structured – it can still be structured play but … still what interests you. And you need to find … people [who provide] the structures and the support [so that people find out for] themselves rather than telling them. ….. the biggest thing for me is also then realising how can we help people with that. (James, focus group interview.)

The participants who had a role in supporting others, realised the benefits they would reap from making use of and passing on their knowledge to students and colleagues.

More Productive Work

Other respondents described how their new skills had improved their productivity by making them more efficient and effective in their work. Brenda completely reorganised her personal and working life when she discovered OneNote. She scanned everything in her filing cabinet and home and organised it in OneNote. Other than important legal documents, she threw the rest of the paper away. At work she used OneNote to organise teaching and research materials but the main benefit was she that can use OneNote's drag and drop feature to easily store serendipitous resource finds that she might not immediately need but wanted to collect for teaching or research at a later date. In the past these resources got lost or forgotten because they were out of sight. In her own words:

> OneNote has provided me with an organising system that has made a tangible difference in not only storing files, but in being able to access them quickly (and consequently having peace of mind that they are all where they should be)." (Action research cycle.)

Brenda also confronted Endnote, an application she had studiously avoided, but knew she needed. She wrote:

> I will persevere with Endnote and will continue to use OneNote. Would I have done this without the e-learning group? I can't say for sure, but I'm reasonably certain, that the answer is a resolute 'no'! (Brenda, Action research cycle.)

John was a PhD student who need to find more effective ways of searching for information and organising it. He progressively developed a workbox of tools he could use to help him. For example, of Delicious.com he said:

> it has proved to be a great new tool and I use it already to build my online bookmarks …[it is] accessible worldwide and I used that access recently for work while in Dunedin for a conference. A wonderful and very helpful tool. This alone was worth attending the DIL workshops for (John, blog post).

Of the toolbox John said, these "make my work and search tasks more efficient and also enjoyable" (post-survey). Fiona, who had very technologically literate family, had reached an average level of digital literacy but had not pushed beyond her comfort zone. Problems were solved for her by her family so she had developed neither skills nor persistence at solving technical problems. She saw the project as an opportunity to enhance her work effectiveness. While she has become proficient in a number of tools, one of the main benefits for her has been her new approach to problem solving so that she: "will use tools such as Wikipedia and Google and even YouTube if it helps to throw light on a problem" (Fiona, blog post).

Helen found that her uses of new tools had introduced a degree of flexibility into her work. Her work was often interrupted by students and other urgent demands. She now spent small blocks of time between interruptions searching online for useful information which she stored using Delicious.com and RSS Feeds. She said goes back to these when larger blocks of time were available to read or listen in peace. As she said:

> Well I have changed my day to day practice. …, if I just have five or ten minutes, I will get on the web and I will add all these things on Delicious and then go and read them later so there is that and … the RSS feedback [so I] have just sort of changed my actual daily practice and just sort of confident about knowing that I am able to go and find out stuff I need to know.... so I think it has had a really significant impact on my work life. (Helen, focus group interview.)

By developing better skills in handling and organising digital information, and knowing where to look for resources, participants were more able to work effectively.

Advocating for Changes to Professions

Several participants looked beyond improving their own work performance and could see how new technology could enhance a profession or a community. Many of them felt a commitment to advocate for such change. An interesting example of this was Thomas who saw the potential of digital information to advance the cause of Maori on the international front, and to improve social work as a profession. He wrote:

> As a Maori practitioner in social work, the wide usage of Information Technology would be useful as a part of professional development. The need to use Information Technology by the way of the computer would be a great to continue the focus on the delivery of excellence. Using te reo Maori is great, however using this format would advance us to a global market.
>
> With regard to social work the use of this technology is the way of the future, which is essential for the contemporary social work. Much information is useful form the various websites, hence the transference of information would be useful. Many of these websites are in the international workplace of the profession of social work, and have relevance for the future social worker in New Zealand, (Thomas, blog post).

He went on to write that the online environment and tools:

> …allow for a … process in which the practitioner engages in reflective practices in regards to their work. Also allowing for the process to refine and present a critique process in sifting [relevant] information out, so as to create a robust approach. …in a new field the ability to reflect and review is essential for the purpose of social workers and counsellors" (blog post).

Thomas's aspirations for Maori were also worth reflecting on. His goals included:

> Using this process for indigenous advancement is a step in the electronic direction. It also engages in Maori see communication as information sharing which may not be seen as culturally appropriate (kanohi ki te kanohi) face to face not through an electronic process." (Thomas, blog post.)

Another participant who also felt quite evangelical about sharing his new knowledge and bringing about change to his community up North was Bernard who found:

> Shift most certainly happens! And yes, I would like to be a part of this shift. And yes, I will be asking my principle and elected representative about what changes should be made so all our children, parent, civilian, public can benefit from this digital technology." (blog post.)

Sarah was particularly interested in PLEs and is keen for others in her profession to work co-operatively to help everyone become more efficient. She said:

> My dream is that we (the profession) build a wide-ranging library of free resources that we share, which can be accessed anywhere in the world. Then the time and resources we spend in 're-inventing the wheel' can be spent in other ways." (blog post.)

Another participant, Helen also hoped to bring other people in her area together to share resources, support and ideas. Her first attempt was going to be with others in the same area

in her own institution, but she wanted to go on and create a national network. To this end she was developing a website that would act as a forum for interacting and a repository for resources and ideas (blog post).

One participant, James, saw the need for academia to transform itself to accommodate the potential inherent in the field of digital information. As a librarian he saw himself as playing an important support role in this transformation. He said:

> … if academia does not start making up some of the ground they've lost then universities are in danger of being left behind as places of learning; if the system does not adapt then it is in danger of being seen as antiquated and irrelevant. …… Also because things have been done for a certain way for the entirety of living memory then when something new comes along there is a great sense of inertia which this new technology has to encounter." (James, blog post)

He felt that directives or advice from academics to students was also problematic and in the focus group interview said:

> …you have a problem particularly in an academic setting, the lecturers are saying don't use the Internet and for a start with in cultural studies, you need to use the Internet because you are studying what a culture produces … (James, focus group interview).

Therefore, the knowledge which participants gained during the project was destined for a wider audience, similar to the snowball effect of knowledge sharing which had occurred in the research groups.

Changing the Way They Learn

Most participants found that their development in digital literacy was matched with a change in their learning behaviour. An interesting aspect of this change was a growing self-awareness of how they approached learning and what worked for them. These changes manifested themselves in four ways. They came to recognise that their old methods of learning were not suited to learning new technology, and accordingly made shifts in their approaches to learning. Secondly, they also found that as their confidence grew, their attitudes changed from fearing the technology to feeling that they could give it a go when faced with new problems. Thirdly, they realised that learning to use new digital tools was different to normal classroom learning in which the focus often has a strong learning about focus. Learning new skills involved practising the skills and was therefore much more time intensive for participants. Understanding the importance of practice and being willing to commit time to achieving desired levels of skills was also a change for some people. Finally, partly due to the nature of the workshops and the use of reflective journals, many participants recorded personal growth and increasing independence as learners.

Learning in a Group

Most people had previously had experience of learning in a group but the general consensus was that it had not been a satisfying experience. In the focus group Vera explained:

> It was mentioned by groups members who are also employed as teachers and managers, that students baulked at getting in to groups for learning and I would identify with that because I hate it. As soon as a lecturer says get in to groups, I think god I wish I hadn't come today. (Vera, focus group interview.)

However, Vera found the safe, supportive collaborative approach adopted by the group enabled her to push boundaries and know she had a safety net, and she expressed this by

saying, “One of the best things that’s ever happened to me this group.” (Vera, Workshop notes) and she wrote: “Group learning is a brilliant format. It reminds me of the movies, as the American marines say…no one ever gets left behind” (Vera, blog post). She felt that the approachability and support of all the group members created “a safe environment” for her to be able to say “I don’t understand”. Someone was “always available to help and learning blossomed” (Vera, blog post). She coined a phrase that was adopted by the group “There’s always Friday” (the day the group met). Problems and frustrations experienced between meetings were tempered by telling herself that even if she couldn’t solve a problem at the time, on Friday someone in the group would be able to help.

Vera found that the relationships within the group made a big difference as indicated by: “100% easier and enjoyable to learn with a group who become friends and mentors” (blog post). Being part of a group and discovering that her fears and frustrations were shared by others – knowing she wasn’t alone was hugely liberating according to her blog posts.

Others also commented on the satisfaction of being in a community of learners. “I have enjoyed learning in a community of practice” (Katie, focus group interview). She also stated, “The thing about this particular project that’s been useful for me, we have come together as a community of learners, a community of practice and I’ll miss it when its not here” (Katie, post-survey).

A second aspect to the group format was the diversity within the groups which facilitated learning from each other. Participants became aware that others in the group, who may even have fewer digital information skills, were still able to show alternative models of learning or approaches to problem solving. In this environment, group members shared ideas and skills willingly.

Katie found “…the discussion groups invaluable to see how others were utilising different modes in their teaching. Where they had accessed info etc.,” (post-survey). In a focus group interview she said:

> I found it was useful to look at what other people were doing - starting out there on their blogs stuff it was really good just to be able to see what other people had done, it was like is that a good model or not?

This sentiment was also expressed by Valerie who also found sharing with other participants motivating, and wrote:

> …group was diverse and that is interesting to see other people learning” and “it really gave me a sense of the community, but also that other people were interested in the learning because that is a motivator on a different level….Everybody doing something different added to my knowledge”. (blog post.)

Helen described how she benefited from the learning and exploring of others in the group.

> I try to keep up with everyone else’s blogs once a week or so – which has been a great way of feeling still involved, even if they’re working on something that I don’t intend to follow up. And I realise I’ve learnt so much about web tools and ways of working that I never would have made time to find out for myself. So my potential ‘tool box’ has gotten MUCH larger - it’s like everyone else has been buying fancy kitchen equipment for my cupboard and showing/telling me what it's for - I may not want to use it just yet, but if I ever get around to doing a really fancy dinner.... (blog post).

Vera had an interesting explanation for the success of the groups, “Everybody gets a thrill from each others achievements” (blog post).

The researchers running the workshops determined early that their role would be facilitators rather than teachers to promote collaborative learning within the groups. Initially, some participants struggled with this concept. Rita said in the focus group interview:

> I had the expectation that you [the researcher], were the expert [and teacher] and I actually found that quite hard and thought after two weeks, 'I have had enough of this'! I like to go in and get maximum input so it was actually quite a switch psychologically for me to say this is a different way of learning and now it feels, on reflection, is a much better way of learning than just having one person having the knowledge.

If we compare this to what Rita had said in an earlier blog, we can see how far she came in changing her attitude to collaborative learning, by this statement: "I am doing another course and was reflecting on how I am learning all that new information. There are two key things to my learning which parallel this experience on DIL. Having an "expert" to answer the hard questions. Other classmates are useful to embellish and explain but I think there is always a role for a "teacher". (Rita, blog post.)

One of the advantages of collaborative learning identified was the amount of incidental learning that occurred. Participants often did not know what to ask because they didn't know what existed, but ideas and tools mentioned or demonstrated by others in the group prompted unexpected learning. As Helen said,

> There is a lot of learning by accident…I mean I learnt a lot of stuff that I wouldn't have because I didn't even know it was actually out there to learn and even if I had known, I might not have – if I said oh no, I just want to learn this, and just be very blinkered but because other people were learning it and they were enthusiastic so it wasn't so much a matter of going to someone and saying can you actually help with this, it was actually peering over the shoulder and going "what are you doing?" So I wouldn't have thought to go and have a look at Mahara and I might never use Mahara for any portfolio but now I know what it is, and now I can make a decision about whether to use it or not and that was something that I wouldn't have ever asked anybody how to learn"(focus group interview).

The format of the workshops and the opportunities for interacting and sharing provided by online tools, as well as the reflective nature of the processes used in learning, gave participants additional resources for their digital information toolbox which they could take away.

Learning from Play

The notion of learning from play was often raised by participants during the project. Participants recognised that this was an effective approach often used by young people. Playing was an opportunity to explore with an open mind to see what was there. It was about being open to new opportunities. Some felt guilty playing in work time, and it took time for them to give themselves permission to learn this way. Helen explained it like this:

> I think this approach of playing around with it being completely open and not expecting anything, like this, this and this for the information at the end is what made this group very successful. Everyone was just curious and got on from seeing and doing what others were doing so that is the best frame of mind for learning, (focus group interview).

Fiona thought this approach was very useful in a very new learning context, "It's interesting isn't it, before you know stuff, it is hard to set objectives because you don't know what you

need to know but as you get in to it, you start to get a clearer picture of what it is you need to know or should know" (focus group interview).

The idea of being open to new opportunities was endorsed by Brenda who said, "… having the attitude I am here to learn something. I am not exactly sure what, at least that was my approach and the readiness of taking whatever comes up. I will have a look at to see whether I can use it or whether it is of interest to me. I think that was what made this successful for me at least" (focus group interview).

Katie likened the experience to children getting and Advent Calendar.

> I used the metaphor of a children's advent calendar for my learning over the time of the project; opening a series of exciting doors to reveal what lay behind. I feel like I have been playing with many tools and many ideas for their use. Each new door led me to another set of ideas that I could put into practice. I felt that during the project I needed to learn everything that was on offer. Now the project is over it will be time to consolidate and close some of the loops on the active projects I have started on, (blog post)

The ability to understand play as a useful learning strategy was influential in helping participants to build their confidence to tackle new aspects of digital information, and was a skill they took with them when the project finished.

Learning Strategies

Many participants adopted new strategies or approaches to digital learning. Rita puts it succinctly, "I need new way of learning with this stuff, it is about process not outcome", (blog post). Stewart's comment in a focus group interview, is used to expand this idea of process in learning:

> So probably the life long learning for me has been the notion that change is inevitable and you have to lose something to actually gain something. A lot of the traditional methods that I have used with my education don't seem to apply that much with the new sort of speed of accessing and the Internet and stuff like that so I have had to change a bit about the way I think I learn, about the way I set goals and stuff like that" (focus group interview).

One of the most common strategies was to "just do it!" according to Helen in a blog post, and work through problems if they arose. This approach had the advance of increasing confidence when it was successful. However, participants found it was more time consuming. Bernice, expressed the need for support: "I think my preferred learning style is to have exposure to something new - an idea or software - have a "hand-held" first experience, then play with it on my own, knowing that I can ask for help if I get stuck" (blog post).

Valerie also used this strategy for learning, as indicated by, "I just click here and what happens and oops that isn't what I wanted, so I do a lot of that and I find that quite helpful. You learn something every time you go around and around the menus" (focus group interview). She mentioned that playing a lot on her own helped because it "gave me more confidence in actually using it and when I came to a problem, instead of just giving up I was trying to work through until I found the solutions" (focus group interview). Valerie also acknowledged that she learned in a particular way, and said: "I wouldn't have necessarily given up, I probably would have put it away and not gone back to it in a big hurry". Although confidence building, play was time consuming. It was quicker to ask (focus group interview). And in a workshop, she said, "I am missing a step and I can't seem to get it right, I need some human intervention" (Valerie, Researcher workshop notes).

Just having a go was a personal shift for Jesse who wrote on her blog, “I think the more you do and just give it a go the more confident you become. I also think the support of others around you is really beneficial when you meet in groups”. In a post-survey response she wrote, “my confidence has increased as I have learnt the new technology”, and that “has made me keen to learn more to enhance my teaching practices” and “there is great excitement when I conquer something new” especially “if it something I have heard others talking about or observed ad wondered how they managed to do it” (Jesse, blog post).

In the exploratory learning environment of the project, participants often developed problem solving strategies that involved using the Internet. The statement by Valerie epitomised a frequent comment by others, “I would be more likely to explore online tools and see if they are an answer to my problems”, (post-survey). Similarly, Rita wrote, “…now if I wanted to find something out I would go to YouTube first to find out what to do, have a go, ask and expert to help and then I reckon I would have it sussed!” (blog post.) Andrew also advocates using the Internet to find answers:

> But I will tell you what, people who are working in isolation, you can just type a question in to Google. Google will find [an answer], you will be amazed, you will find hundreds of people who have worked on similar problems who have learnt all the tricks. So people have spent their time to doing this problem, we did this and this didn’t work so we did this, and you will get the solution, that’s what the net will do, if you have a problem then go to the Internet and there you will find a solution, (Andrew, focus group interview).

Faced with a learning environment that was unfamiliar to them, participants had to evaluate how they had worked in the past and make adjustments to the new context. Rita analysed her own learning which allowed her to “identify obstacles within my own thinking that I wasn’t aware of that have prevented me from learning in the past”, (blog post). Helen, who was not a teacher, found, “Helping others is good fun and good for confidence levels – and I often learn more by helping” (blog post).

In the pre-survey, Fiona evaluated her preferred learning approach as being “given written guidelines, then working through them with someone on hand to help”. She found that: ”As I live with computer savvy people and it is a waste of time to employ trial and error when there is often a simple step I have overlooked”. (Fiona, pre-survey.)

In an early blog she wrote:

> I tend to have a lack of persistence in trying new technologies because I do not have endless amounts of time to use trial and error. I also manage to do something but then returning after a period of time I forget how to do it. I need the repetition to make it stick into long term memory. (Fiona, blog post.)

By her final blog her view had changed:

> However on reflection what I have gained is a change in attitude towards technology. I have observed other people's different approaches to learning new things and realized that my attitude is all I needed to change to be able to do anything I want in this area. and "that is huge" for me. I have relied in the past on others to tell me what to do technologically, instead of thinking it through for myself. It is not what I do in any other area of my life. I have been a little afraid to use trial and error learning as it seems often to be a waste of time when someone knows the answer. So from now on I will use tools such as Wikipedia and Google and even YouTube if it helps throw light on a puzzle. (Fiona, blog post.)

Some participants changed the way they approached learning, for example, Bernice found that she had "to keep learning the lesson of patience with myself and my own ability to learn and then remember that other people have the same thing about having to process and learn" (focus group interview). For Rita it was about structuring her learning; she "wanted to know everything but learning needs to be in small chunks. Learning the basics first – not the fluffy stuff." (blog post.) She also found that it was:

> Good to sift through all on offer and decide what I want to keep, whereas initially I felt I had to know it all…. Have I learnt much? Yes, but I must admit it has taken longer than I had thought….But I realised that it is all not as daunting as it was at the beginning. (blog post.)

Using her new approaches she found that: "Learning is incremental but progress is getting made, don't feel I am on the outskirts of technology any more" (blog post). Victoria found a slightly different approach worked for her, "I find I need to keep it simple - by using the reflective step in the process I can take more control of the process am not frustrated by the problem." (Post-survey).

Brenda described her approach to learning digital skills by using an analogy to reading skills:

> I sort of use the analogy too around literacy, we all have word attack skills. If we don't know a word we can sound it out and do it phonetically in phenomes or whatever you call them, and so I think that is around the digital literacy you can find your way around them, if you have got the word attack skills you can try something a little bit more complicated like a word. (focus group interview.)

A number of participants reflected on the impact of their new skills on their future behaviour as illustrated in the following quotes:

> Now, I'm to grow up with this learning. This way of learning will eventual be an everyday part of my life. I will use this technology as though I can't go without it. Much like checking my cell phone every morning to see if messages have been sent while I was asleep. My children and their children will grow up with this information capability and I need to grow with it, or get left in the dust with stale bread and stagnant water. (Bernard, blog post.)

> I don't think digital literacy will ever stop – it will just get bigger and bigger. This programme has helped me be more proactive about things – actually look for stuff that I never thought was possible. I could actually go and look and see where to find it – it was just a matter of where I went and deep interactive learning - as a student I hate lecturing, just standing there saying "this is a piece of paper" read it or don't. Finding ideas and brainstorming. The Internet lets you do that to a wider community. You don't have to be stuck in the one classroom, these are the people you contribute with, but you can contribute with outside people as well, because the Internet has got a bit of everything that you want. Its creating your own package of what you want to do and finding the answers to be able to do it. (Naia, focus group interview.)

Most participants commented during the project on the emotional ups and downs they experienced, from highs to frustrations when things went wrong. Two of them explained these more fully. Jesse reported that her feelings about learning a new tool differed at each stage, and wrote:

> Usually at the beginning I was optimistic and felt reasonably confident. As I moved along feelings were mixed depending on well it was going (feelings I noted above). The end usually brought huge satisfaction, pride and confidence (email).

> I felt [both] challenged and frustrated. When things went well I was very excited, if they went bad very angry … usually blaming the computer or the program! (Jesse, Action research cycle.)

A participant from another institution made a similar reflection.

> I found it interesting that I still had a similar range of emotional response to this issue - feeling upset and embarrassed that I didn't have the software working properly (not very professional), then getting over that and actually enjoying at least some of the problem solving part, then frustration that I couldn't get it sorted - relief that I could get help, and finally pleased with myself that I got somewhere. Maybe I will just continue with that cycle whenever I learn something new. (Helen, blog post.)

She went on to note, “Some degree of tenacity and self belief is required to lead to success”, (Helen, blog post).

As demonstrated, participants made very real changes to the way they approached new learning and exhibited a range of strategies and engagement in action learning.

Personal growth and attitude shifts

Some participants saw their learning during this project as a form of personal growth in which they became more independent in their learning. Victoria explained “there’s a kind of apprenticeship process that you go through when you learn something in the early stages, the middle and the last, and that is the process of becoming independent in a way” (focus group interview). Sandra saw it more organically, “The [project] provided a starting point. I came looking for a start point, so I will keep on using it and keep myself organised. I have been using it like this since we finished the [project].” (focus group interview.)

This personal growth was important for participants in developing autonomy in using digital tools for information, and required a change in attitude which was demonstrated. Almost everyone commented that they had experienced a shift in attitude. Many started from a position of feeling negative about technology, some were so fearful they had physiological reactions when confronted with it, others were proud of their technophobia. In time they came to view it as essential to being literate in the 21st century and even a source of enjoyment.

> I too suffered those sort of physiological reactions with the environment that I was going in to and consequently I just didn’t go in to them (Stewart, Focus group interview).

Once Stewart discovered the many resources and tools which were available he became excited and interested to find out more instead of limiting himself through avoiding them. Mary described a typical fear that many participants had of being afraid of touching the technology and breaking it or causing irreversible damage, she went on to say what happened when this fear was overcome:

> You don’t look at it and think you can break it or break the world now, I am much more able to try something before I run for help. In other words, whereas initially I just looked at anything new and yelled ‘help’, now I don’t ask for help until I know I have tried all manner of things and I am really, really stuck and that’s a huge growth thing for me…. (Mary, focus group interview.)

Avoidance behaviour was also typical of Fiona as evidenced by her comment in the post-survey:

> The skills I have mastered will be of life long importance to me, but more important than the skills I have learned is the attitude change I have experienced. Where once I would have shunned tools because I thought that using them was going to be too difficult, now I will give it a go… I feel I have removed a barrier in my mind about learning these tools. I now know there are a number of ways to tackle the learning or sourcing of information and I am less likely to give up if I do not get a solution immediately.

This was reinforced in her blog:

> However on reflection what I have gained is a change in attitude towards technology. I have observed other people's different approaches to learning new things and realized that my attitude is all I needed to change to be able to do anything I want in this area. and "that is huge" for me. I have relied in the past on others to tell me what to do technologically, instead of thinking it through for myself. It is not what I do in any other area of my life. (Fiona, blog post.)

The attitudinal shifts which participants demonstrated would be very helpful for their future learning about using technologies for information use.

Give it Time

A common theme amongst participants was the issue of time. Most felt they didn't have enough, yet recognised that nurturing new skills takes time. Recognising the importance of developing these skills and balancing that against the urgent demands of work or home was on ongoing issue for most people. Thomas explained this in a focus group:

> Because like anything else, you know, seeds, when a seed falls to the ground you've got to give it time. I think that's something like myself. I've got to have time to process that, but also to allow it to grow there, so because I've injected an amount of time here I'm not going to let it be wasted because that information and that knowledge base that I've gained is going to be used to the advantage of the students here and also the staff, personally for social work. So, yes it's increased my confidence also it has allowed me to know that things start from a seed and then they start to grow so thank you for that.

A number of participants commented that the project legitimised two hours spent in the weekly workshops, Stewart's comment was representative:

> I think one of the biggest pluses for me in being part of the group was that I committed myself to a two hour period where I was almost forcing myself to be involved in something where I might find something else to do (focus group interview).

However, justifying the time needed for practice away from the workshops was harder, for some, as stated by Mary: "Time was my major issue. I did not have enough time away from the [project] to put things into practice" (post-survey). Sarah recognized the process was time consuming but felt it was justified, "I do not see it as a waste of time because it is my way of learning and it has had academic outcomes already eg I have had one conference paper and a book chapter accepted within the space of 9 months, based on my online experiences and learning" (blog post).

Participants certainly realized the value of utilizing dedicated time to develop their digital information skills.

Future Proofing

Most participants recognised that the value of their new skills was in preparing them for the future. Some saw it as the start of an ongoing process of learning and personal growth. Others felt that this was the way to get ready for the future. The benefit perceived by some participants was that they were becoming more fluent in a language that enabled them to interact in different ways with different people than previously. Others perceived their future in terms of being involved or networked with like-minded individuals in communities of practice or interest. Finally, one participant noted the importance of the human element to the online environment and predicted that this was so important that it would find ways of infiltrating the digital system.

An ongoing process and preparing for the future

Most participants saw the project as the start of a journey. In fact, the metaphor of a journey cropped up repeatedly in blogs. An example of this is Vera who wrote:

> I have learnt so much but more importantly as it draws to a close I remain totally motivated to continue the journey. I have the tools, I invested in a large monitor and a new grunty beast to drive it, and me, as far as I want to go. Thanks to L and the whole group I have learnt the basics, found my confidence, fired my enthusiasm and there are endless goals to investigate and hopefully conquer. Thank you to everybody concerned for helping me to digitally fly. (blog post.)

Thomas used a different metaphor, but the sentiment is the same:

> I think myself if I use a Maori metaphor, call it te kako – which is the seed so this to me is like a seed that fell to the ground into my thinking and it's for me to nurture it and nourish it and it 's called the waitanga - to make it grow so the small beginnings have great endings. When I look at it due to the amount of time that we started here, I think it's just like an entrée and we go on to the bigger meal. (focus group interview)

Bernice saw digital literacy as more than skills for work. Digital literacy to her was about personal growth and she was using the opportunity of the project to prepare herself for retirement, and further learning and she said:

> I'm saving these things up for when I'm freed up from this daily drudgery, for when I've got time, my real desire about retiring is time, and again it's the time for playing with stuff. I know you can't do it all the time when you retire so although I can't address some of these things now, and look at these things now, they are going to be there in the future when I'll really be able to have a good go at them so it's like anticipating learning in the future. (Bernice, focus group interview.)

Thomas saw digital skills as important for socialising in the future, "you have a whole group of people you are socialising with - to do it electronically is something new, we're not used to it, but that's probably the face of the future" (focus group interview).

Participants could see the value in being digitally competent for securing approaches to learning in the future. As part of this, the ability to communicate and use the appropriate language was necessary.

Another Language for Communicating

One of the benefits of this project for some participants was the opportunity to learn another language that expanded the people they could communicate with. As Katie explains, its **"**another language that we can be literate in, then it's having other people that we can communicate with. But that's been the advantage of this group, being able to have conversations about the same sorts of things in a similar language. Though we're just making baby steps it's been a real benefit", (focus group interview).

Victoria asserted, "To be helped is very important. To know what help to ask for, and when to go for assistance and how to communicate this clearly is another aspect of the digital literacy skill set." (blog post.). She elaborated in the focus group, "...some things I didn't get help for because I didn't know how to put it into words because it was quite technical....You have got to be able to articulate it. That's one thing online requires." (focus group interview).

Fiona found that as she gained proficiency in digital skills she has found herself taking part in conversations with family and friends she wouldn't have previously, "I have a 'switch off' mode when they (tetchy husband and son) are talking. In the last week I've started to pay more attention to their computer conversions….Last night we had dinner with a young couple and they started talking about Skype. My ears pricked up and I was able to take part in the discussion". (Researcher workshop notes.)

Its not just spoken conversations that people were able to take part in. Liza wrote, "since my involvement with this project I have started to take more interest and am now reading the Inbox articles in the Listener magazine, and find that I actually understand increasingly what they are talking about (blog post). Helen made a similar discovery, "I'm becoming more aware of DI issues. Saw in the paper that a major fault has been found in the Internet core. Normally wouldn't even read it!" (Researcher workshop notes.)

Engaging in Communities & Connectivity

Many participants see themselves as going forward by connecting with others in communities of interest, or creating their own small communities where they share their new skills. Thomas explained, "the need for networking is of importance, especially in terms of various ethnic groups such as Maori, Tainui affiliation. [They] will have quick response to [requests for] information." (Action research cycle.)

Stewart explained his plans for the future:

> I think I would probably be at literacy level one, and I want to go to level two and I realise that once I got to two, there will be level three and then there would be four. But I would like to do it with a reason to do it, not just go to classes, but actual uses and I think my primary use would be the developing some of those little interactive communities around certain things. (focus group interview.)

Sarah described her interpretation of connecting with others, "actually writing the post is secondary actually to what blogging means. Its getting out and connecting with other people. You've got to commit to connect with other people before they come back and connect to you." (focus group interview.) In her blog she clearly recognized that connection was important and wrote, "by telling my stories and reflecting online in an open environment, I am opening myself up to an international audience which hugely increases the opportunity for peer review, collaboration and learning." (Sarah, blog post.)

Naia also picked up the theme of connectivity, **"**it was good to hear ideas, like we all have different ideas and we talk about it and like – that's a good idea! We'll go and try it – that's the connectivity that we have within this group – like I'll tell someone to go there and someone else has somewhere else and the connection just contributes to the whole learning environment" (focus group interview).

A number of people proposed sharing and helping others in their immediate circle. Vera wrote "Not only has this group achieved that [digital literacy] for me but it is passed to my family and friends whom I have been able to help as I now also I understand what computer literates are talking about" (blog post). Helen also found family to be a beneficiary of her skills, "so 16 year old daughter, very computer literate but not at blogging, so I introduced her to blogging and I felt good about it" (Researcher workshop notes.)

After the workshops finished Jenny emailed to say how she was using her new digital skills to support a network:

> I am now helping a conservation group with a Media Project. I often need to send email to the group members around 30 people. I only rely on the Windows Vista, and the Microsoft Office Outlook 2007 which I can easily organise my emails and group mails…. It also has Business Contact Manager that I will work on a bit more later.
>
> And I have registered a website address in China, that I only need to pay very little annual fee. It allows me to put my contents into the default model and I can get 24 hours' online support. … this project has made my life and my work much easier (Email message).

Clearly participants, through the skills they discovered and the ways in which they learned to articulate, were able to extend their networks and share their knowledge.

Blurring the Boundaries between Work and Play

Many participants commented on how they found taking part in the project made them realise how online environments really blurred the differences between work and play. As described earlier many of them grappled with guilt associated with playing during work time. They felt that increasingly in the future they would be less likely to regard the playing aspect of digital exploration as play. For example, Sarah wrote: "I really like this idea of 'play'. Certainly maintaining this blog and all the other things I do online do not feel like learning but more like 'play' and having fun. And I wonder if that is the reason why people do no engage with this sort of activity at work, especially ... professionals. This sort of activity is considered to be 'play' so it is not appropriate when you are 'at work'." (blog post.)

Fiona was surprised at her own behaviour, and expressed this in the focus group interview:

> And I thought what am I going to do with this and then I thought well I will just – you know you are always looking for better ways of working and I wanted to hang things up and get working a lot more efficiently, but do you know, the strange thing for me, and this was the first time and I can honestly say this, in my entire life, that I have procrastinated with anything because I wanted to play and I have never ever played before. I have always got on and done the job, but now I will think I will just spend another ten minutes, I will just move this over here and oh what does that do up there, and I have honestly genuinely have never ever done that.

Katie had similar problems disciplining herself, and said in the focus group interview:

> My interest was in pursuing my own learning no matter the random directions I went in that's where I was. So for me what I enjoyed was coming here and learning new

> stuff. And learning how to use different types of equipment and so once I've got a little bit of learning my brain wanted to get onto the next new thing rather than settle. I looked at that reflective cycle and thought yep at the beginning you made us come up with a project we wanted to pursue but I really didn't do that because there were so many interesting things along the way but I'll go back to that because I've developed sufficient literacy to be able to re-focus but because of the way this was set up I felt I wanted – oh someone's doing this or doing that and I wanted to find out rather than get on with my work as it were.

John thought adults were handicapped because of our attitude to play and learning, and said: "That's an advantage with the kids these days. They start playing around with Google and they start playing around with word for home essays and eventually they can use any other programme just straight away because they have that logic" (focus group interview.)

Sarah thought that educational institutions have missed the point, and wrote about this on her blog:

> What saddens me is that some educational institutions .... appear to have lost sight of many of the advantages of online social networking. I am still convinced that the way to manage online activities is to facilitate them, rather than push them underground - to encourage constructive conversation and critique, as opposed to censorship. (blog post.)

There were many different examples of how participants regarded play in the online environment as important for developing capability in using digital information.

The Human Element

One of the participants articulated the sentiments about human presence on the Internet. Katie wrote, "It was curious that all of us, though this was a project about digital information literacy, enjoyed the face to face contact with members of the group and wanted to continue building the community of practice that has developed over the last few months" (blog post). Later she expressed more about the importance of being connected.

> I was just thinking about the connectedness and I think the fact that we now have things like the virtual conferencing and Skype and that sort of thing so you can actually see a person's face and we're moving back to trying to make that personal connection f2f rather than just words on a computer screen so I guess that's bringing the human element back in. (Katie, focus group interview.)

Other participants also found the personal connection to be very important as mentioned in the section about PLEs and social networked communities. Therefore, it was regarded as important to be able to humanise the digital environment when developing skills for lifelong learning.

The Drive to Continue

For some the digital environment became almost addictive and their increased confidence also became a driver for them to keep going. As such participants became quite committed to continue to keep developing their skills for the future.

The Addictive Effect

Despite early apprehension, most people found that once they started the journey they felt compelled to keep going. Marilyn wrote, "...I always feel so excited by this new knowledge (for

me anyway) it motivates me to try new aspects of DIL" (blog post). She expressed this even more strongly later in the post-survey, "You develop a hunger to try new technology. There is so much I want to learn – it has opened a new world for me." Bernard said on a blog post, "As long as I've got some power, I can have life long learning – however, going back to the far north, doing the old podcasting back there –absolutely LLL - providing I have the tools and those things necessary to have it all there, with my study."

Bernice compared the addictive affect as being, "a whole lot more to try out – it's a bit like playing a computer game, and finally progressing to the next level!!" (Action research cycle.) Alternatively, Melissa wrote, "It's hard not to keep going now tho isn't it cos now the seed is planted and you just want to keep growing now" (blog post). Sharon explained the logic of keeping going**,** "I think definitely it is something like learning to read. You don't go I know the alphabet, now I can quit. There is so much more out there, and it is intriguing and interesting and you have got some basic tools and away you are going to go and keep going". (focus group interview.)

Growing Confidence

Every participant recorded and increase in confidence in one forum or another. Many had started with very low levels and made large strides. Examples of the starting point are quoted below:

> Everyone is patient although they must feel frustrated with my slow thoughts and practice." (Marilyn, Journal.)
>
> When I hear the others talk they sound so knowledgeable! I panic! I went to a 'clicker course' and I experienced that feeling of helplessness- what am I doing here feeling – it was above my head. "(Marilyn, Journal.)
>
> I was at a loss what to do with all these BRILLIANT but electronic resources. My aim was really quite simple - turn this luddite (not completely I can use facebook, the Internet and email without much help) into someone that really felt confident in using [LMS] in a classroom context (Grace, blog post.)

The effect of growing confidence was an increase in motivation. Nothing succeeded for the participants like success. Vera wrote, on her blog and in the pre-survey: "I left the first session quite disillusioned as to my capability and wondered whether would my questions hold up the proceeding" (blog post). She also stated, "Feel I don't understand as quickly as others and therefore embarrassed to ask" (Pre-survey). By the post-survey she was able to say, "Confidence and enthusiasm to achieve new skills increased by 100%. Relaxed about learning and more inclined to try by myself."

Stewart also took small steps to gaining confidence, and said, "Um, I was a bit intimidated by some members of the group because they seemed apparently so much more literate than me." (Focus group.) However, he also said, "… one particular person I did find particularly helpful within the environment was someone that showed me– not to be fearful, helped me to understand that it is okay to be a bit sort of left footed and stuff like that…" (focus group interview.) Bernice said in a focus group**, "**Definitely feel more knowledgeable, confident. I don't care if I don't know now cos I can go out and find out. That's my attitude, whereas before I was a bit hesitant."

Katie described her journey, "Through all of this I have really begun to understand what being a "digital immigrant" means. The language is so foreign, the culture feels alien, I feel incompetent. I am out of my comfort zone." Then, "There's a culture, (dunno if it'a geek

culture or what) and those who can belong have got dil and I'm starting to feel as if I belong because I can communicate with my son on similar terms." (focus group interview.)

Victoria started with "A fear of failure and concern for the digital divide, then there is a high pressure situation that will require troubleshooting feelings of inadequacy." (pre-survey.) Later she was able to write, "In hindsight I think once I got over all the connectivity hurdles and took some calculated risks like publishing a blog and collaborative editing in a wiki, I was pleasantly surprised. I suppose than my resistance dissolved. In hindsight I feel I crossed an invisible digital literacy line. Navigating this signified much more than a significant level of success." (blog post.)

Mary described her change in detail in the post-survey and on her blog:

> Making mistakes is no longer the issue it was. Exploring what a site or software program has to offer is no longer intimidating. I did not grow up with this technology so it was quite scary to have to start using it. Initially I worked on a need to know basis only. This did not help me become aware of what was out there. I am more inclined to explore now and I wonder why I was so anxious to begin with . I have had a huge shift in attitude…. I am more confident about exploring and trying to fix my own problems. I now enjoy the process. (post-survey.)

> Attending these workshops has been quite a personal journey of awareness for me. I have realised that prior to the workshops I saw myself as more confident than I was in fact. I think this in part has to do with feeling embarrassed by my poor skills. These workshops have done a lot for me in that I am able to let go of this embarrassment and let others know where I am struggling. Along with this has come a REAL increase in my confidence to try new things. Rather than finding this exploration intimidating and off putting, I am now actually enjoying the process. (blog post).

Commitment to Future Development and Growth

Most people made references to future commitments. Two examples are presented.

> I've got heaps of projects in my head and quite a few beginning, I've made a start on them, it's the completing and finishing that will be interesting. Learning the basics and its foundation for further activity to do with literacy and that leads you onto discovering more things about whatever tools like blogging or whatever you've understood the basics about. It's a foundation that leads onto further information. (Katie, focus group interview.)

> I used to think that the Internet was all about credit cards and we had to have a credit card to go on it – and that's what it always came up with, it kept asking me for my number. But now its opened my eyes where I can now go into areas that I never thought possible and so it gonna be a ongoing thing for me and plus it will definitely help me with my work and what I can do over the net and with the use of the computer I can do it at home, I can do it anywhere I want, so its definitely a good tool for me to use for the rest of my life. It's a lifelong thing. (Jack, focus group interview).

Summary

Becoming more digitally literate has given participants the ability to use a range of digital tools and strategies, the confidence, the support networks and the persistence to continue their life-long learning process. Most profoundly, their new levels of digital information literacy has changed their view of digital technology - instead of being a barrier to the future, it is seen as the gateway.

4.7 New Zealand academic workplace and other OECD countries

In this part of the report, items regarding Research Question Four are outlined: Determine the standard of digital information literacy in the New Zealand academic workplace compared with other OECD countries.

In an attempt to answer the fourth research question, a literature review was undertaken, which can be found in Chapter Two, and measures of digital information literacy were estimated using a pre-survey on entry to the project, followed by a post-survey when participants exited the project. Scores of digital information literacy were estimated for each participant so comparisons could be made between the baseline scores and those calculated once participants had undergone the action research experience.

In previous sections in this chapter, the way in which participants shifted their digital information literacy (DIL) scores as a consequence of the project has been described. This is just one of the indicators of the increase in digital information literacy demonstrated by the majority of participants. However there is more to digital information literacy than a DIL score, and the findings in this project demonstrate the importance of dispositions for developing capability in the use of digital information. Although DIL scores have been calculated for each participant, as a single measure they are meaningless unless there is a global standard against which they can be presented. Unfortunately there is as yet no measure of digital information literacy available for this purpose. This research appears to be the first attempt to measure digital information literacy or capability in the area of digital information.

However, the DIL scores do have meaning for the participants in this particular study because they demonstrate some of the advances which participants made in their skills for digital information capability. Some merit can be attributed to the model used in the research and this will be discussed in Chapter Six. The measures of DIL which were made through the pre and post-survey relied on individual's perceptions of their skills and confidence, and other characteristics associated with self-efficacy in using information communication technologies. Therefore the findings must be viewed with caution, as some researchers may regard a validated and standardised test as a more accurate measure of DIL but as yet there is none available.

The findings in this research indicate that standardised tests or rubrics may not be the best approach for ascertaining digital information literacy. The use of ICT in teaching and learning is highly contextualised and therefore multiple factors are likely to impact on DIL. A feature of the OECD Programme for the International Assessment of Adult Competencies (PIACC), which may become available in NZ by 2011, is that it will explore the cognitive processes which underlay literacy rather than the use of specific ICT. The reason for this is again, the difficulty of assessing technology aspects of information literacy given that the use of ICT is usually highly contextualised.

Chapter 5: CASES

5 Introduction

Two types of cases are presented in this chapter: 1. an institutional case which describes the similarities and difference between the four participating institutions, and; 2. a collection of individual cases which illustrate key findings in the project. The institutional case is used to describe the general trend, and also the skills and capabilities in digital information literacy notable at each institution. In the second part of the chapter, individual cases are presented of participants who demonstrated either a significant shift in their digital information literacy, or made interesting advancements in their approaches or capability.

5.1 Case about Four Institutions

In this case, findings from each institutional group (Appendix 12) have been combined to provide a case about four institutions and provide a snapshot of the digital information literacy skills and computer capability exhibited by each group of participants during the project. The case is described with respect to the numbers and composition of the groups involved, as well as their levels of confidence with regard to digital information, and in the use of computer-based and Internet-based communication and information methods and tools. The interactions in the workshops and the descriptions of digital information literacy and capabilities for using digital tools and strategies are also presented.

Numbers

Overall, 42 participants started the project; three attended the first workshop but did not carry on and therefore were not counted, and five participants dropped out. Most of these left after the third or fourth session and time pressure was the most frequently cited reason. Of those who finished, 12 were students, 20 were staff and five were both working and studying. Two groups (Institutions Three and Four) had a balance of staff and students and the other two groups had more staff than students, some of whom were also studying.

Confidence demonstrated in the groups

The four groups differed on the level of expertise and confidence for digital information and tools with which they started the project, and this has been outlined previously. Institution Two had participants with a wide range of digital information skills, and overall high levels of confidence in using computer-based and Internet-based communication and information methods, even regarding new tools. Similarly, Institution Three had only one participant who considered herself low on skill and confidence with the rest of the group ranging from average to high. However, more than half of participants at Institutions One and Four rated themselves as having low levels of competency and experience while the remainder of the group members rated themselves as relatively high.

Tools

Across the groups, most participants stated in the pre-survey that they were familiar with Internet search engines, library databases and online directories and used these regularly. According to the pre-survey responses and observations and discussions in the workshops, few participants had experience with Web 2.0 tools such as blogs, wikis or other social sharing sites for locating, retrieving, analyzing or applying information. There were also a small number of participants with advanced computer and Internet skills who were using graphic design and video editing software, programming,

language and open source software. By the end of the project, this situation had changed considerably with participants using a much wider range of Web 2.0 tools and approaches.

While most participants, apart from those in Institution Four, set up blogs for use as reflective journals, the blogs varied in how much interaction they generated within each group in the way of posted comments. Institution One participants actively read each others' blogs, but the researcher reported that comments were kept for the weekly workshop rather than being posted directly to the blogs. For this group and for the group at Institution Three, email was an important way of staying in touch in the week between workshops. However the group at Institution Two rarely used email for staying in contact. Institution Four participants made an attempt to communicate using Facebook which was not very successful although two people used it to share their work and a few comments were placed on the shared wall. People in this group mainly chose to use personal reflective journals which were shared with the facilitator via email.

Workshops

The workshops had three distinct sections. The session started with a review of the previous week's progress, follow by a discussion, presentation or demonstration. For the later part of the session participants engaged in personal self directed work and projects. For Institutions Three and Four, the focus was the tool, or issue introduced and this sometimes led to diversions as people explored something new.

An observation made by the researchers and feedback from participants in the workshops indicated that some of them preferred to interact face-to-face in the workshops than online. Also researchers made the observation that participants interacted as a group more frequently when face-to-face in the workshops compared to online via email or on each others' blogs. Preferences for face to face interaction were voiced by some in workshops at Institution Three and Four. Also participants at Institution Four in the iocus group interviews stressed the importance of having to come to the workshops which meant they dedicated time to developing their digital skills. For example, from the researcher's observations and the focus group interview it is known that participants at Institution Four appreciated and realised the importance of attending and interacting with a group of diverse people, mostly not known to each other. The confidence to ask and offer help grew noticeably for the less experienced as the workshops progressed. Also who they sat next too, usually different people, mattered, and very interesting conversations and sharing of knowledge and skills emerged in all sessions. Feedback from participants at Institution Two also indicated that they preferred the face to face interaction and the sharing that occurred spontaneously there.

Workshops for all groups were well attended and eventually generated enthusiastic discussion once people were settled into a routine and familiarized themselves. A minority of participants at Institution Three stated at different times during the workshop sessions that they felt slightly intimidated when hearing terminology which was unfamiliar, and when they were shown the range of tools available on the Internet. Some participants in this group also said they realized how little they knew about how to access the breadth of information available. Comments made by participants in the group at Institution Two illustrates the feelings expressed by some.

> Thoughts - How computer literate am I really? Comfortable in current space, can bluff some others, but also am often completely bewildered.(Bernice)

> I fumble through quite a lot (Melissa).

Many of the less confident participants said during discussions in the workshops that they particularly took comfort from listening to others and realizing that they were not alone in facing technology

phobias. A great deal of opportunistic learning resulted from chance interactions during these sessions, often appearing to have quite a large impact on the nature or direction of someone's learning. The most defining characteristic of the workshops for all groups was the willingness of the majority of participants to share and support each other. For example,

> I thoroughly enjoyed my time learning from others (Liza).

Only one participant made a negative comment about the experience of learning in a mixed ability group.

In the following section, a description of how participants in the four groups performed under the digital information literacy (DIL) categories of recognition, access, evaluation, management, application and ethics and issues is presented.

DIL Categories

The information for this section is compiled from the individual group summaries prepared for each Institution, and is based on the digital information literacy categories used for analysing qualitative material in the project: recognition, access, evaluation, management, application, ethics and issues.

Recognition

The ways in which participants were able to recognise the information, digital information strategies and/or digital information tools they required or realised what was available is outlined in this category. Recognition evolved in a series of stages for most participants. First there was the recognition that they had a gap and skills and knowledge regarding technology, mostly in a work context, hence the need to join the project. However, once they started many people found they had overestimated how much they knew about digital information technology, not so much in the work context, as in the existence and use of Web 2.0 tools and the concept of online social communities. Participants' exposure to new tools during the workshops and from their own searches, often triggered new recognitions about alternative methods or solutions. Consequently, for many the journey to achieving their goals did not follow a straight-forward and pre-determined plan. It progressed organically as new possibilities were recognised and accepted along the way. In some cases people changed their goals as a result of recognising the value of new possibilities. While all participants started with the recognition that improving their DIL skills would be beneficial for their work, many also made changes during the project related to their personal and social lives.

It was observed by the researchers that some of the new recognitions experienced during the project came from incidental, unplanned interactions between participants in the workshops. It follows that the quality and intensity of interactions between participants appeared to be related to the information knowledge they needed as they worked alongside each other in the workshops. For example, participants at Institution Three explored different options for RSS feeds together, with a more advanced participant showing someone who was new to the feature, what she was using. This occurred at the start of the project once participants were shown, by the facilitators, the benefits of getting information to come to them.

Sometimes during the workshops, when people explained what they wanted to do with digital information, and were given a range of options, it was evident that they were having a eureka moment when they realised the benefits of the new tool. For example, Laurie wanted to find a way to store digital material for her research, and was really impressed by the idea of using a wiki as a way to collate material in a central place.

It was evident throughout the project that participants who were at the lower end of the digital information literacy continuum often did not know what they did not know, and needed assistance with recognising and realising their digital requirements. As well as participants needing to be able to recognise what sort of information they needed to reach their goals for extending their digital information skills, they also required the ability to be able to access the information as effectively as possible.

Access

For this category, the ways in which participants knew where the required information could be located and how it was obtained or accessed using digital means is described.

A number of issues were related to access and were very similar across the four groups: familiarity with tools and strategies, awareness of functionality of open websites and software, Internet terminology, awareness about Internet processes and protocols (security and registration), ability to manage access to websites, equipment and broadband. Also in one institution there was a disconnect between the open web tools used in the workshops and access for everyday workplace use.

As indicated by conversations in the workshops, all participants used a computer for their work or study and said generally they were comfortable with the tools they used regularly, such as search engines and library databases. However, when stepping outside this zone of familiarity participants observed in the workshops also stated they encountered a number of obstacles which hampered their progress and motivation. For a start, participants often did not know what sort of tools was available and where to locate them, or which sites were most suitable for the purpose for which they were needed. For example, most participants were not familiar with photo sharing, bookmark sharing or document sharing sites, and although they knew about Youtube, they were not aware there were other video sharing sites. Also many did not understand the processes involved in using the sites.

The facility sharing websites were not seen as user-friendly to the uninitiated (Blip.tv, Youtube, Bloglines, Wikispaces, Google documents, Slideshare, Flickr.com, etc.), because the new users did not understand the security measures employed by the sites. Measures such as: registration, setting up a profile, verification emails, activating the accounts and anti-robot/spam devices (e.g., verifying security letters when submitting comments on a blog).

A common event for many participants in the workshops was to try to log onto to a site, only to be repeatedly told the username or password was invalid. None of the error messages mentioned that it was necessary to register before access was given through logging in. This misunderstanding was repeated a number of times before people began to remember to register first. Several participants in the workshops related stories of their adolescent children making the same mistake. Other features that made websites unfriendly to users in the project were inconsistent standards and protocols which required re-learning the system with each new website. For example, having to have different usernames and passwords for different sites caused some confusion for participants. Many of these small problems and inconsistencies seemed to cause the greatest discouragement.

Additionally, participants themselves often created access problems. For example, many participants at Institution Three who were new to Internet sites used for social networking such as Flickr.com, Delicious.com, Animoto.com etc., and various blog sites, encountered difficulties when they were unable to login when returning to the sites. The primary reason for the difficulty in accessing the sites was participants' failure to remember their login details – username and password. In some cases, once they were shown how to request login details from the site, they gained access; however, in some cases they had to set up new accounts. Also participants often did not know how to manage multiple login details, and as one participant (Carol) said in a workshop: "I have too many and I forget

them." Carol was assisted by a facilitator to organise her logins and web addresses using iGoogle. This is one example of how the facilitators in the workshops and also other participants, experienced in using Web 2.0 tools were able to furnish the less experienced participants with tips to make future access to a range of sites easier.

As well as actual access to various sites, terminology associated with the Internet was a common problem. The jargon associated with the online environment led one participant to say she felt like she was in a foreign land. While the meaning of a single word was easily checked by participants, many found that they needed to become comfortable with the language of the Internet if they were to progress their skills and communicate with others in this environment. For example, some terms which participants encountered early on related to tools and online strategies, and included words such as: RSS feeds, wikis, Web 2.0, social networking, social bookmarking, gadgets, download, upload, wav, mp3, open source etc., names of software, names of social networking sites and much more.

For participants, being able to communicate with colleagues and family members was an important aspect of their literacy. However, although some participants were delighted with being able to speak the same language in order to get the help they needed, others who were more knowledgeable were sometimes a barrier to them building their capability. A number of participants said in the workshops that they had more IT-savvy family at home, and this often appeared to be more of a hindrance than a help. Participants said during the workshop discussions that they found the help from these family members discouraged them from having a go on their own and thus contributed to keeping them in a dependent state. Several participants during the course of the workshops realised the importance of getting on with it if they were going to progress their skills.

Equipment and broadband were raised as access issues by a number of participants. Many had inferior equipment at home, or no broadband, which created high levels of frustration when they tried to transfer and practice their workshop learning to home. The digital divide between home and work/school was considered to be a major equity problem for the education system. For example, at Institution Two, participants who had been able to access a range of Internet tools and sites (Delicious.com, Skype, Youtube etc.) during the workshops were unable to access these sites from their regular workstations. This was due to strict Firewall regulations at the institution, and was a major contributor to participants not being able to practise and use their newly developed digital skills in the workplace.

Additionally, the ten week timeframe of the project did not enable the majority of participants who were new to Web 2.0 tools and networking enough time to develop the expertise needed to explore the wider networking aspects of the Internet. Therefore, access to the full potential of the Internet was not always realised during the project. During the course of the project, participants overall at the four institutions developed their abilities in accessing an ever increasing variety and range of digital tools and methods for interacting online. During the project they also learned how to more effectively evaluate the information they were discovering, both in the workshop sessions and in their self-directed learning.

Evaluation

For digital literacy in this category, participants had to know how reliable the information they found was and also how effective the digital tools and strategies were for the purpose for which they were needed.

Participants were constantly engaged in evaluation of information and tools as they sought to reach their goals and find the tools and information needed to achieve these ends. They did not always

clearly articulate the exact criteria they used for evaluation; however, at least three general criteria were widely used: fit for purpose, comparison with alternatives and ease of use. Also criteria related to online safety and security, accessibility and ethical use of information were used but less commonly mentioned.

First and foremost tools had to be fit for the purpose for which the participant intended to use them, and this usually meant they had to evaluate the technologies they discovered against other alternatives. Often this involved identifying which was the most flexible or had more functionality for the intended purpose. Therefore the first two criteria often overlapped. For example, some participants wanted to download images from a digital camera and store them in a central space which was easily accessed by a range of people - friends, family and colleagues – as well as themselves. They were also interested in finding photo editing and presentation tools. Therefore, they had to find out what was available, and then spend some time exploring the functionality of the various technologies which included computer-based tools, software and web-based tools and strategies.

In one case, Sonya spent time looking at what she could do with her photographs from a digital camera. This involved learning how to download them onto the computer as she had never done it before, and find out where to store them on the computer so she could find them again. Sonya also wanted to make the images easily accessible to family members and was interested in using a web-based tool so she considered the features of two web platforms: Picasa.google.com and Flickr.com. The Homepage of Picasa invited the following:

> Picasa is free photo editing software from Google that makes your pictures look great. Sharing your best photos with friends and family is as easy as pressing a button! (http://picasa.google.com/)

Whereas, Flickr.com promised this:

> Share your photos. Watch the world. (http://flickr.com)

Additionally, Sonya wanted to present some of her photos as a moving sequence so she investigated Animoto.com, because she had seen other participants using it in the workshops. This time the enticements for using the facility were:

> We make killer video from your images automatically. Turn your photos & videos into pure amazing. Animoto automatically produces beautifully orchestrated, completely unique video pieces from your photos, video clips and music. Fast, free and shockingly easy. (http://animoto.com/)

During the workshop, when Sonya and others were exploring the benefits of using one web platform or software over another, a participant asked a question about Animoto.com compared with a similar commercial programme PhotoStory, a Microsoft product which was free to download to a Microsoft Windows system. During discussion participants were able to evaluate the differences in functionality between web-based platforms for manipulating and storing images (Picasa, Flickr, Animoto), and a computer-based and local technology (PhotoStory). Information sharing also came about in the workshop interactions when the facilitator and another participant informed the group that Animoto could only handle a short show (15 secs). However, they were also told that it was possible to pay for a version that would do more, and that Animoto needed to be compressed or it was very slow to upload. All these features associated with the tools were scrutinised during the evaluative process. They were also told about another programme called SlideShare.net which could be used to create presentations on the web. Therefore, as this example illustrates, although Sonya and others had a

simple goal based on managing images, the options and available technologies for how to do this, required a reasonably complex level of exploration and critique as part of an evaluation of the options available to them.

Another type of evaluative criteria based on ease of use was often mentioned as important by participants. This was particularly important to those who were selecting tools that would be used by others. For example, setting up presentations was a popular topic of interest. Participants explored software such as PowerPoint for creating the slides, also Windows Moviemaker for turning the slides into a movie and Audacity for recording audio. They also investigated web facilities such as Slideshare and Myplick for slides and audio, and Blip.tv, Animoto and Youtube for uploading video. The participants wanted software which they could learn easily to create their presentations, and they also needed to find manageable ways to publish their presentations so others could easily access them. In some cases, participants wanted to publish the presentations on their blogs so this involved an investigation of technologies which enabled an end product which was able to be uploaded or linked to on the blog. Hence again, once the range of options was presented and explored, participants were able to make decisions based on a sound evaluation of several alternatives.

There was less evidence of participants evaluating the reliability of information gleaned from the online environment as part of the learning and evaluation process, however, the reliability of sources of information from the Internet, such as, Wikipedia versus more traditional scholarly publications was discussed in workshop sessions. For example, participants at Institution One, discussed during a workshop session, different modes of recording evidence, and the following was noted:

> ... Somebody asked what Web 2.0 was. The Delicious site and Wikipedia were used as examples. This immediately prompted a lively discussion on the nature of truth and reality. The more academically inclined were concerned about the validity of contributions and the truth by popular vote, others found the concept empowering. We concluded that the kind of peer review that governs sites like Wikipedia are probably superior in some ways to the journal review process that academic value so highly because it is done more transparently and by a larger number of the community. We also decided that knowledge on Wikipedia was serving a different purpose to the research results and theorising of journals. (Workshop notes, Institution One.)

This example, illustrates the importance of group interactions and discussion during a process of evaluating digital options, and also the type of thing which participants considered when evaluating elements of the open web. The ability to evaluate a variety of information options was found to be extremely important and was done in several ways by participants. Another aspect associated with digital information skills is the management of the information which is accessed and evaluated, and this is outlined next.

Management

In this category, the ways in which participants approached the organisation of digital information and made available for future access or use is addressed.

The management of electronic information was a major concern for a large number of the participants, particularly those who were collecting and linking to resources for work or study. A range of diverse solutions were selected depending on the individual's need; from Endnote and Onenote to Google Reader, iGoogle, RSS feeds and social book-marking facilities such as Delicious.com. Some participants said during workshop sessions that they needed to balance time efficiencies with having "time to play" (Workshop observations and notes). In other words, they really wanted to explore what was available on the Internet and needed to find the most optimal solutions in the shortest possible

time, therefore they needed to be able to work as efficiently as possible. Participants in one institution were really pleased to hear during a workshop session how RSS feeds could increase their efficiency in accessing information, so the information came to them instead of them having to search for it all the time.

An example of how information was organised and managed was presented by Sarah at Institution Three during a workshop show and tell which was done at the start of a session. Sarah explained to the group how she had set up an ePortfolio on the web using a blog and a wiki. She did this so she could have a professional presence on the Internet, and as a result had had 13000 visitors in a year. Sarah said she believed it was important to have an open presence because it made it easier to link with other professionals around the world. As a result of her open, online portfolio she had linked with people both in the USA and in Australia that she would otherwise never have connected with, and this enabled her to continue to expand her online networks.

Participants were also shown how to organise material using Google reader (http://www.google.com/reader/), Bloglines.com and iGoogle (http://www.google.com). There was some discussion on how to select material to keep. Participants discussed the fact that both Google and Bloglines newsreaders had facilities that allowed for the keeping of clippings, that is, storing links to articles. Sarah mentioned that although she did not use a reader a lot, it kept her in touch with what was happening in the blogging communities, and enabled her to see what was repeated and might be worthwhile following up. iGoogle was set up by several participants at Institution Three and Four as a personal web page where links to websites, web tools and an array of gadgets (“cool and dynamic content that can be placed on any page on the web “) could be arranged in one handy place (http://www.google.com/ig).

The ability to organise and manage the incredible range and volume of digital material was regarded by many participants as an important aspect of developing their skills. The way in which participants used what they were learning was another aspect of importance and is covered next.

Application

In this DIL category the focus was about using digital tools or strategies, for how information is used, applied, communicated, or synthesised to create new understandings.

Application of information was the central activity and consumed most of the time and effort during the workshop sessions. Individuals all had different objectives and so there were many different types of activity going on throughout the project. For example, Victoria investigated different options for adding audio to her blog for an assignment – Slideshare, Myplick, Audacity, Powerpoint – and whether to use wav or mp3 files.

Even people who shared similar goals found different solutions. Laurie, Claire and Sarah investigated the use of wikis for preparing resources. Whereas, Laurie preferred the idea of a closed wiki site for her purpose of collating resources, e.g., Wetpaint or Wikispaces, Claire and Sarah chose to use WikiEducator for setting up learning resources because it was an open site and more easily accessed by students.

The diversity of activities and approaches seemed to have been instrumental in cross-fertilising ideas so that people often looked beyond the obvious answer to more creative solutions. For example, the experience of using blogs for the project and exploring Mahara for ePortfolios, resulted in Mahara being used for reflective journals in one teacher’s classes following the project. Another participant entered a whole new world of professional online networking as a result of the project, and others moved on to use wikis and social bookmarking for sharing resources with students and colleagues.

Also one teacher started to post links to YouTube on the institutional Learning Management System for students to view.

While most people became proficient in a small number of tools, all participants explored and played with a large number of tools. Some of the tools in use by participants included: wikis, an LMS, eePCs, digital recorders, digital cameras, iPods, Smartboards, social networking sites, technology sharing sites and much more as mentioned previously. Whilst perhaps not developing specific skills this exposure increased confidence and familiarity with online tools as well as with a different way of working in digital environments.

What was telling as an outcome of the project is the way in which participants intended to continue to use their new knowledge, and this is described in more detail in the Section on lifelong learning.Lastly the capacity for handling the ethical elements of digital information is covered next.

Ethics and Issues

In this category how ethical considerations and digital information issues were recognised and/or acted on is described.

Ethical and related issues were widely discussed by all groups. Internet safety was a concern to most people and the groups worked during the face-to-face sessions to find acceptable solutions to protecting identity, privacy and information. For example, setting up usernames when registering on open sites, which prevented easy identification, was important for some participants, and not for others who for professional networking reasons wanted their identities widely known and accessible. Also many participants, who had little previous experience with social networking tools, were surprised at the type of personal information individuals' posted on social networking sites such as Facebook. One participant mentioned that as a professional she had to be careful about what she wrote on her blog, and said in a workshop session that there were pros and cons. For example, "If you kept a locked down blog you could only interact with a few people, and when open you found others to link with…" (Workshop notes, Institution Three). She also mentioned how online controversy had led to some people closing their blogs. The same participant also mentioned how her family sometimes questioned their privacy in relation to her blog. However this participant wanted her blog to be open and accessible to colleagues as it expanded her opportunities, professionally.

Another aspect of the open web which was discussed was the problem of plagiarism which participants felt had appeared to have been exacerbated by online information. They were interested in discussing solutions to this issue, such as plagiarism detecting software, and options for being creative when assessing student work. Some participants were concerned with institutional barriers to accessing open resources, e.g. Youtube, which were also widely discussed, as was the issue of intellectual property, copyright and the web. As part of the latter topic, Creative Commons licensing and the public domain was explored during the workshops. On the whole, participants were quite open to the idea of sharing information more freely and using fair use copyright strategies to make material more accessible.

From an examination of how participants demonstrated skills of digital information through the categories of recognition, access, evaluation, management, application and ethics and issues, it was clear that considerable movement was made in all these areas. There were similarities across the four institutional groups as well as individual differences in the way in which participants approached the progression of their goals.

Additionally, the characteristics or dispositions demonstrated by participants which enabled the development of digital information skills and capability were investigated and the outcome of this process is described in the next section.

Participant Capabilities

In order to develop the skills and capability for recognising, accessing evaluation, managing and applying digital information in an ethical manner, participants were expected to demonstrate particular dispositions or characteristics. Thus the interactions and the evidence they provided during the project were examined for confirmation of dispositions such as: confidence, problem-solving, motivation, interaction, reflection, technical aptitude, beliefs.

Confidence

A person demonstrating capability in this category has confidence in his or her own skills and abilities (self-efficacy) for using information communication technology (ICT) – is not afraid, anxious or intimidated, and is confident enough to make mistakes, and proficient enough to correct them. He, or she, does not get easily frustrated, and is happy to spend time working things out and is not afraid to experiment.

The confidence levels of participants as measured by the pre and post-surveys varied from very low to very high. All participants both in the post-survey and in the workshops and focus groups claimed an increase in confidence levels by the end of the project, though the greatest increases were most evident in those who started with the least confidence. Levels of confidence for using information communication technologies were closely associated with levels of digital information skills and knowledge; as indicated by the pre-survey responses and observations made in the workshops. Also growth in skills related to individuals' DIL scores in the post-survey aligned with an increase in confidence. Those low in confidence seemed to underestimate their knowledge and ability, as observed during workshop sessions, and have greater expectations of failure and frustration. These participants also frequently expressed anxiety about learning to use the technology and making mistakes, characteristics associated with low self-efficacy in eLearning.

For most participants in the study the rise in confidence was not a continuous up-ward swing. An improvement in confidence when observed in workshop sessions was often followed by a crisis of confidence, and participants appeared to alternate between euphoria and anxiety with the upward trend only becoming apparent over time. Some degree of anxiety and frustration was evident in some participants particularly when learning new things. For example, Jesse reported that her feelings about learning a new tool differed at each stage, and the following excerpt is from one of her email messages to the group:

> Usually at the beginning I was optimistic and felt reasonably confident. As I moved along feelings were mixed depending on well it was going (feelings I noted above). The end usually brought huge satisfaction, pride and confidence and I felt challenged and frustrated when things went well I was very excited, if they went bad very angry…usually blaming the computer or the program! (Jesse, email forum.)

By the end of the project, some participants stated in the workshops, and in their responses to the pre-survey, that they now had less anxiety about making mistakes, and would just give things a go. However, persistence and confidence, attributes usually associated with high self-efficacy, were not always correlated. For example, a small number of confident people admitted, during the workshops, to giving up easily if an approach did not work quickly. There were others who were very low on

confidence but persisted with problems, trying alternative solutions and seeking help until the problem was solved. Most participants however, rated themselves in the post-survey as relatively persistent.

Thus having confidence in digital information appeared to be a requisite for being able to work towards solutions. The next characteristic of problem solving incorporates multiple elements related to the way a problem is approached and the processes undertaken.

Problem solving

A person with characteristics in this category is able to identify the nature of the problem, devise an approach and work towards a solution which contains digital elements. He or she demonstrates logic, inquiry, flexibility and creativity.

The more highly skilled and confident a participant rated themself on the survey or appeared to be, as observed in the workshops and in their reflections, the more likely he or she would independently tackle problems. Those low on skill and confidence particularly felt they needed access to an expert and expressed this during workshop sessions. As the project progressed participants found that the combined expertise of the group was often enough to help or provide suggestions and alternative approaches. In time, the group during the weekly or fortnightly sessions became a significant resource for problem solving. Some problem solving also occurred via email forums as well for Institutions One and Three, and was demonstrated on blog posts for the latter group.

An important issue for low-skill participants, which they mentioned in the group sessions, was having the ability to articulate problems in a manner and terminology that elicited useful help from experts. As their own grasp of digital terminology grew participants said they were able to get better access to assistance. With greater confidence and experience participants were observed to develop strategies for dealing with problems. They also became more willing to tackle problems and delayed seeking help except as a last resort. In fact, some participants said that knowing the jargon was very important when they called on family, colleagues or professionals for help. Not only could they ask for the appropriate help, but they could also understand the solutions better, and they were willing to try another approach when one didn't work. For example, a participant said during the focus group discussion: “I’m starting to feel as if I belong because I can communicate with my son on similar terms” (Katie, focus group interview).

Another participant, Andrew willingly took a leading role in helping participants who were less skilled than himself and derived much pleasure from this. He said: “when someone in this group has a problem it motivates me to go and find a solution. I enjoy it.” (Andrew, Researcher workshop notes.) Thus he demonstrated abilities to not only problem-solve for others but to interact with others in his research group, and he was confident to be an active part of an international IT community. This participant demonstrated many qualities including problem-solving, interaction and motivation, and motivation is discussed next followed by the characteristics associated with interaction.

Motivation

In this category, a person has a positive attitude towards exploring and adopting new digital tools and strategies, and in extending and developing use of known tools and strategies. A willingness to take risks, engage in practices and to produce outcomes is also demonstrated.

All participants started with at least moderately high levels of motivation to develop their digital information skills, as evidenced by their willingness to take part in the project. In addition, each person came into the project with specific issues for which they were seeking solutions and goals they wanted to achieve. Mostly their goals were related to work and study initially; however exposure to a

new world of Web 2.0 tools and strategies as well as engagement in a cohesive group stimulated an intense interest across all groups in using new skills and knowledge in their personal lives. For example, a participant in one institution was very keen to work with digital holiday photos; something this person had previously had little experience in doing. Others created digital stories using personal pictures and open software called Animoto as well as musical tracks they had sourced on the web.

The role of a supportive, collaborative group in feeding motivation cannot be overestimated and was remarked upon repeatedly by participants during the sessions and in the focus group interviews. The group environment seemed to work at several levels. First, they worked collaboratively. They supported each other by offering encouragement, empathising, giving positive feedback and sharing knowledge and skills. The group set up for the workshops also appeared to provide a safe environment where the majority of individuals felt comfortable taking risks and trying new things without risk of embarrassment or criticism.

For example, Vera at Institution One was a convert to the benefits of collaborative learning. She said in a blog post that as a student she had disliked working in groups with other students. However, she felt that the approachability of all the group members created “a safe environment” for her to be able to say “I don’t understand” (Vera, blog post). She felt that someone was always available to help and as a result the researcher noticed that Vera’s learning blossomed.

Finally, perhaps because of the diversity within groups, each member appeared to inadvertently model alternative behaviours and approaches that may not have been available had the groups been more homogeneous. For example, a participant at Institution Two related the learning done in the group to a community of practice and said:

> I have enjoyed learning in a community of practice (Katie, Post-survey).
>
> The thing about this particular project that’s been useful for me …we have come together as a community of learners, a community of practice and I’ll miss it when it’s not here. (Katie, focus group interview.)

The workshops themselves also contributed to high motivation by formalising time when participants were allowed to play and explore new tools without feeling guilty about wasting time. As one participant said:

> I feel like I have been playing with many tools and many ideas for their use. Each new door led me to another set of ideas that I could put into practice. I felt that during the project I needed to learn everything that was on offer. (Katie, blog post.)

Additionally many participants spent time tinkering outside the designated workshop times, and some sought external expertise from outside the group. Others spent time researching tools and in helping others as well as themselves. Therefore motivation was about trying out new tools and also about being interested enough to help others solve problems. This disposition overlaps with one describing interaction.

Interaction

In this category, a person demonstrates the ability to share, collaborate or interact within the digital information environment when seeking information. This includes a willingness to engage in a two way information exchange with others, and contribute digital strategies and tools to another’s knowledge bank.

All participants engaged in seeking information, as this was the nature of the learning experience in the project. As reported previously, assistance was sought and accepted and a lot of sharing went on in the sessions, fostered by the initial round done at each workshop. It was quickly established that there was no such thing as a dumb question - most participants admitted some aspects of ignorance and a desire to learn. A spirit of genuine collaboration in the workshops was established and help was reciprocated. The importance of attending and interacting with a group of diverse people, mostly not known to each other, was appreciated. The confidence to ask and offer help grew noticeably for the less experienced. Who participants sat next too, which was usually different people, mattered, and very interesting conversations and sharing of knowledge and skills emerged in all sessions.

What was interesting about the groups was the wide range of sources from which they were prepared to seek help. Most came to the workshops with the expectation that the facilitators/researchers would take the normal teacher role and some appeared to find it perplexing when this did not happen. Consequently, they were forced to find alternative sources. Such as peers in the groups or experts from within the organisation or externally. The researchers observed that participants in each group regarded the other members of the group as an important source of information, and most people appeared to feel comfortable asking others in the group for help. This happened in the workshops but also asking for help became the main function of group emails at Institution One and Three, when people were working on the research project during the week.

Participants at each institution also became progressively more confident about finding answers online. For example, several participants at Institution One commented on the usefulness of being able to type a question into Google and make contact with people and/or solutions that had already been found. With greater confidence participants also found information in the news media that they would not have paid attention to before. Virtual interaction with others was more limited overall, particularly in Institutions Two and Four. In the former group, even when encouraged to comment on each other's blogs, little activity ensued and the interaction remained in the face to face environment.

Experienced people also enjoyed learning something new, and those who found that their level of digital information literacy mostly exceeded that of the rest of their group had to organise specific information opportunities and assistance. For example, a session on programming with an expert in the area was organised by The experienced participants were also willing to share their knowledge freely, either in the workshops or via their blogs or on the email forum if one was in use. A participant at Institution Four made some very valuable contributions through sharing some of his interests such as Google Analytics, copyright knowledge and Twitter with the whole group. Also Sarah at Institution Three demonstrated her choices for a personal learning environment to others in the group and assisted some with Web 2.0 tools.

Participants also reported sharing outside the group with a number of the participants saying in the workshops that they were planning on sharing their new expertise and confidence with others – either with colleagues, their fellow students, their own students or family. The group at Institution Two expressed a desire to continue meeting after the project finished – and arranged a reunion a month later as well. Several participants commented in the workshops that their new vocabulary enabled them to discuss DIL topics with others such as the younger generation, IT support staff, and to interact in a more informed and technical manner. They also appeared more willing to engage in casual conversations in social contexts regarding IT issues and as a result learnt new things this way. Many younger participants also used their friends for advice and information.

One participant in particular spent much time playing around to help others and stated: "It is amazing how well and strongly one learns through friends in a group. It gives great satisfaction to solve a friend's problem." (Andrew, focus group interview.) The climate in the groups was one of trust and

openness, creating a very safe learning environment. Participants commented frequently on the importance of this to the quality of their learning experience.

To summarise, there was definitely a tendency for participants to collaborate with each other in the workshops, and some did this between workshops as well, therefore peer interaction was very prevalent. The participants were encouraged to record their learning experiences and interactions and this relates to a disposition of reflection which is outlined next.

Reflection

People with this disposition have the ability to examine the practices and thinking of self and others in the digital environment.

In this research project, this attribute was prompted by the use of action cycles, blogs and journals and the discussions in the workshops as well as by the focus group interviews. The ability to critically evaluate what they were doing, and broader aspects of digital information, if not evident in written form, was present in other forms such as group contributions. Some staff and students were already well versed in the art of reflection and for some blogging came naturally to them. Consequently they willingly shared their thoughts, knowledge gains and feelings about their experiences. At one institution, two Tangata Whenua males wrote on their blogs, revealing a great deal about their feelings and how digital information would affect their futures, both in work and personal environments. For example, one participant said in the focus group interview:

> I think of myself if I use a Maori metaphor, call it te Kako – which is the seed so this to me is like a seed it fell to the ground into my thinking and it's for me to nurture it and nourish it and it's called the Waitanga - to make it grow so the small beginnings have great endings when I look at it due to the amount of time that we started here, I think it's just like an entrée and we go on to the bigger meal. (Thomas, focus group interview.)

He also said:

> The thing about this particular project that's been useful for me we have come together as a community of learners, a community of practice And I'll miss it when its not here. (Thomas, focus group interview.)

At Institution Four, three people kept detailed reflective journals, two linked whatever they were doing to Facebook. This tended to be examples of their explorations, or demonstration material. However, one of these people used his linked blog to assemble quotes relating to the use of blogs for academic purposes and he annotated these quotes with his own views, hence providing relevant reflections on one aspect of Web 2.0.

In contrast, there were participants who were not so enthusiastic and blogged very little. One participant explored a joint blog for gaining feedback from students, while her own was really an experiment in the environment rather than a personal journal approach. Additionally, a lot of reflection happened in the sharing sessions during the workshop in the form of dialogue. The focus group interview sessions also yielded rich material about participants' progress and their thoughts on the future. At Institution Four, the use of action learning cycles was not as successful as at the other locations. Although all in the group were aware of how action research fitted with the project, they did not find it easy to fit what they were doing into action cycles was less easy.

The quantity and depth of reflection, as exhibited by participants on their blogs or other means of journaling, as used at Institution Four, varied enormously between individuals. At one end of the scale

were participants who wrote little and were mainly descriptive in their account of events and what they were doing. For example,

> I bookmarked a few sites on del.icio.us - would like to have figured out how to download them to be able to use them on power point but failed miserably (Melissa, blog post).

At the other end of the spectrum the most reflective participants also tended to write the more frequently and at greater length and provide more in-depth explanations and critique. For example,

> I think it's for me because a lot of this stuff is new, I mean I'm fairly computer literate but maybe not a sort of digital information literacy literate I think for me there is a tendency always to experiment, to be curious at the beginning before I start to be productive so thinking about it in terms of yeah, I was going to do podcasts, it was actually too much of a box to put myself in so I didn't. (Katie, blog post.)

These individuals documented their actions with reasoning, were able to express what they were learning and demonstrate new knowledge as a result of those actions, and consciously set new goals for change to capitalise on their insights. In one group, it appeared that those who were younger and/or male were less reflective in their writing while older females tended to be more reflective. However, this pattern did not hold true for other groups where men were also demonstrating aspects of reflective writing as deducted from an analysis of their blog posts.

Many of the reflections indicated that participants recognised in themselves a particular learning style, approach or behaviour in relation to learning about digital information. Often closely aligned to insights about learning was an examination of their emotional response to learning new technology. For example, Sharon wrote on her blog about her feelings in relation to technology and what she experienced in the first workshop session:

> When I attended the first meeting, I think my mind boggled because I had thought that as I 'used' a computer every day and was able to 'look things up' in a scholarly manner, that I would have a relatively good 'handle' on things. So I was a bit overwhelmed to realise I actually know 'next to nothing'. And of course there's some part of me that expects that I should know more, and that's where I started to feel a bit panic e about my ability to actually be able to do the things others were talking about in the first session. (Sharon, blog post.)

Many were surprised to discover their feelings were cyclical in nature; a new task would cue anxiety or frustration which sparked either an avoidance response or a decision to approach the task with determination, and they wrote about this. Engagement and subsequent success prompted euphoria or confidence. In the following quote, some of these aspects are illustrated:

> … I bought a new camera and did some videoing … I then tried to use Movie Maker and edit it. Well after a few frustrating hours it didn't seem to work. I had difficulty downloading the file into Movie Maker.…Unfortunately I accidentally deleted the video in the process ….I felt rather frustrated because last week I thought I was doing really well at increasing my digital literacy but again I felt that disappointment that it is never as easy as you think! Anyway I haven't given up on this I've just put that on hold.… later in the week.…I followed through on social bookmarking. This was much more successful and I now have del.ici.ous set up on my desktop and have already found it advantageous. (Jesse, blog post.)

However, anxiety and frustration frequently returned when participants were faced with new tasks or problems. A number of people recognised that while the levels of anxiety and frustration experienced might become less intense over time, some measure of discomfort would be an ongoing companion

when working at the boundaries of their knowledge. Some students in particular, reflected that the experience had given them power – to share with others, to advance their communities, to advance their dreams. One teacher saw the benefit of digital information for his teaching and the community it served.

Overall, reflection on what participants were doing to achieve their goals was encouraged and it was more prevalent in some than others. For some writing their thoughts on a blog or in another kind of journal was not comfortable and for others it came more naturally. The use of discussion in the workshops stimulated reflective dialogue in all groups, and in some institutions reflection also occurred online in the form of email discussion and blog comments. It is not clear whether the methods chosen for reflection had any bearing on technical aptitude; the characteristics of this element are discussed next.

Technical aptitude

To demonstrate technical aptitude, an individual uses a wide range of digital tools and strategies and draws on appropriate terminology.

As with digital information skills, technical proficiency at the start of the project ranged from very low to very high as indicated by participants' responses on the pre-survey regarding digital tools. While all participants made gains in digital information literacy scores (Figure 14), and confidence in the use of digital tools (Figure 17) there is evidence that the least proficient generally made the greatest gains. For example, Bernice who at the start of the project perceived herself as extremely unconfident in most technologies, and by the end her and digital information literacy score, had increased by 65%. She wrote the following on her blog at the start of the project:

> Thoughts - How computer literate am I really? Comfortable in current space, can bluff some others, but also am often completely bewildered. (Bernice, blog post.)

By the end of the project, she was regarding her capability quite differently in both the post-survey and in the focus group.

> My expectations of being able to use any digital information methods and tools is now extremely high. I have confidence in my own abilities. (Bernice, post-survey.) Definitely feel more knowledgeable, confident. I don't care if I don't know now cos I can go out and find out. That's my attitude, whereas before I was a bit hesitant. (Bernice, focus group interview.)

Like Bernice, most people came to improve their digital information skills, in particular in work-related areas such as using Web 2.0 tools, and they also made considerable, and unexpected, gains in the area of communication, networking tools. Some of these such as Facebook were of more relevance to social activities, but tools such as blogs, social bookmarking (e.g., Delicious) RSS reader sites (Bloglines, Google reader) and the various sites used for sharing audio visual and text resources (e.g.,Youtube, Flickr, Google documents, Slideshare etc.) and professional networking, e.g., Twitter, were very relevant for use in the workplace, in terms of expanding the range and quality of resources and contacts.

One of the most useful gains in technical proficiency related to the improvement in knowledge about technical jargon and terminology. Many participants, including those who started with high levels of proficiency, commented in workshop sessions, in post-survey responses and in the focus group discussions about learning new terminology. This skill has been mentioned previously as an important aspect of being able to communicate effectively in a digital world.

By the end of the project it was evident across all groups that participants had extended their technological horizons, and had found new possibilities for enhancing both work and their personal lives. Most participants commented that having started a journey into learning more about technology they were determined to keep going. The following quote illustrates this point:

> It's hard not to keep going now tho isn't it cos now the seed is planted and you just want to keep growing now (Melissa, focus group interview).

Also participants expressed the way in which their technical aptitude had developed, as illustrated by the following statements:

> I know more and have more skills. I am aware of more possibilities than before and feel confident that I can give them a go when I have the chance. (Katie, post-survey.)

> I used the metaphor of a children's advent calendar for my learning over the time of the project; opening a series of exciting doors to reveal what lay behind. I feel like I have been playing with many tools and many ideas for their use. Each new door led me to another set of ideas that I could put into practice. I felt that during the project I needed to learn everything that was on offer. Now the project is over it will be time to consolidate and close some of the loops on the active projects I have started on. (Katie, blog post.)

As demonstrated in this section, technical aptitude involved not only the use of a range of digital tools but also extended to proficiency in technical terminology, a necessity for effective practice in a digital environment. One further disposition regarded as a basic need for digital information capability is referred to as beliefs, and the constituents of this are explained next.

Beliefs

A digitally literate person has particular beliefs relating to both the ability to operate in a digital environment and about the value of this milieu. Generally their beliefs also extended to how digital information could be used both for themselves and others.

When starting in the project, participants' beliefs in their abilities to successfully navigate the range of information communication technologies on offer varied considerably. Some participants entered the project believing they were very digitally competent in using a range of tools, and others regarded themselves as woefully lacking in skills. Of course there were a number of people who rated themselves with average skills in accessing and using digital information and the associated tools. However, some of the participants who perceived they had high self-efficacy (as indicated by the pre-survey) discovered, once they were shown the range of possibilities that they knew much less that they realised, particularly about Web 2.0 possibilities. On the other hand, some participants with high levels of confidence in their technological abilities felt that participation in the project had firmed up this belief. For example, James on entry to the project had strong beliefs which led him to favour open source tools and to be very critical of proprietary applications, e.g., Microsoft. As he was already interacting fully in online environments and was an active participant in networks such as Twitter, Facebook and was using blogs, he gained affirmation that he had high levels skills, due to the lesser skilled participants he was able to assist in his group.

The same participant also had a strong belief that computer applications should be intuitive to use. He stated in the post-survey:

> If you can't get the gist of a computer application in a couple of minutes then it is not worth bothering with since it has clearly been designed incorrectly (James, post-survey).

Along with there being some participants with high level skills, there were others at the other end of the spectrum who believed they were technophobic, particularly at the beginning of the project. This sort of belief had previously acted as a barrier to their ability to take risks and explore unknown digital territory. A noticeable change occurred in the participants with this disposition during their time in the project, and their belief in their abilities changed for the better and their confidence grew. Vera for example demonstrated a change in attitude when she persisted in downloading and solving problems with using Skype, and as a result her satisfaction increased through having a successful experience. She believed that the project was responsible for her successful outcome with Skype and at the end of the project she said she was "Marginally more prepared to try things" (Vera, focus group interview).

Carol also believed her skills changed by the end of the project when she said she was more inclined to keep trying. Also when Carol engaged in a process of learning a new tool (blogs) she felt it confirmed some of her beliefs about herself, that is, "web stuff is not me" "I'm a technophobe" and this occurred when she had difficulty in creating a new blog post (Carol, focus group interview). She also said, "…is frustrating and makes me feel stupid!" (Carol, focus group interview.)

From another perspective, all participants at Institution Two believed that having digital information skills enhanced their professional competence. They considered their time had been well spent and were intending to continue as they felt the digital environment had much to offer them professionally and personally.

> Shift most certainly happens! And yes, I would like to be a part of this shift. And yes, I will be asking my principle and elected representative about what changes should be made so all our children, parent, civilian, public can benefit from this digital technology. (Tony, focus group interview.)

Participants at Institution Four also had positive beliefs about what a digital environment could offer for them and others. At the beginning, for at least three, there was the thought that they needed to engage with the environment rather than wanting to as such. By the end of the project they all wanted to do more and more, and were strong in their beliefs that the digital milieu had much to offer in terms of collaboration, information sources, interaction and tools that could support their research, study and presentation of ideas. Others shared the pleasure of discovering new tools and strategies and believed that these would enhance their teaching, or their interactions with others. Similar sentiments were apparent in the other groups as well.

There was a belief in all the groups that being able to understand the terminology associated with computers and the Internet would enable better communication with others who were very competent digital users. For example, as one participant stated in a focus group discussion:

> There's a culture, (dunno if it'a geek culture or what) and those who can belong have got DIL and I'm starting to feel as if I belong because I can communicate with my son on similar terms. (Katie, focus group interview.)

Also, as another participant stated in a focus group interview, information was power, and broadened thinking processes thus giving people more options for decision making. He also believed that digital technologies and the Internet were the way of the future, and posted the following on his blog:

> As a Maori practitioner within [health], the wide usage of Information Technology is useful as a part of professional development. The need to use Information Technology by the way of the computer is very advantageous to continue to focus on the delivery of excellence. Using te reo Maori is great, however using this format would advance this environment to a global market…the way for the future, which is essential for contemporary social work. (Thomas, blog post.)

Therefore, in summary, participants' beliefs in their abilities and in the value of the digital environment were quite variable and there were some changes in belief and assumptions demonstrated by the end of the project.

Conclusions

Although the four groups had participants who demonstrated quite distinct characteristics or dispositions and skills for digital information literacy, they were remarkably similar in many areas. The groups were characterised by their diversity of participants and this fertilised imagination, provided complementary skills and enabled alternative approaches to understanding technological approaches and a digital world. Although differing in the extent to which they did this, the groups all appeared to create safe, collaborative learning environments. All groups reported improvements in technical skills, confidence and motivation in managing digital information. Additionally, participation in a group expanded participants' understanding of the possibilities available, and everyone explored tools and strategies beyond those defined in their individual learning objectives. The following quote sums up this latter occurrence:

> My interest was in pursuing my own learning no matter the random directions I went in that's where I was. So for me what I enjoyed was coming here and learning new stuff. And learning how to use different types of equipment and so once I've got a little bit of learning my brain wanted to get onto the next new thing rather than settle....You made us come up with a project we wanted to pursue but I really didn't do that because there were so many interesting things along the way but I'll go back to that because I've developed sufficient literacy to be able to re-focus. (Katie, blog post.)

5.2 Individual Cases

There are several different cases presented. Firstly, there are cases describing individuals who shifted their DIL capability significantly, secondly some cases of participants who showed little or no change or a negative change and lastly some cases where, although changes to capability were average, the processes they used to develop their digital information literacy were notable.

Cases demonstrating the highest increase in DIL scores

The following individual cases are presented to illustrate how people with very high increases in digital information literacy at the end of the project had undergone this change. Each case is used to outline the participant's starting point in terms of digital information knowledge, as well as the skills, feelings and attitudes each had with regard to digital tools, techniques, social factors and the process of learning they underwent. Also the goals they had on entry to the project are outlined, along with what they learned and how they progressed to achieve those goals.

Case One: Bernice

The first case, Bernice illustrates how participation in the project helped her to make considerable changes to her digital information literacy level.

Starting point

Bernice started the project regarding herself as a digital user who was extremely unconfident about anything other than library and Internet search engines or email groups. Most of the information about Bernice's starting point in the project is obtained from her responses to the pre-survey. Bernice's starting digital information literacy score was 43%, therefore low. Although Bernice was a regular user

of the Internet, she rated herself average at digital information skills and very high as a traditional library user. She claimed average familiarity with New Zealand and Maori contexts for information. Bernice felt her role required digital information skills and that there was room for her to develop them, particularly as she claimed to lack confidence with unfamiliar tools and methods.

Digital tools

The type of digital tools which Bernice used at least weekly included online library databases, search engines and email discussion groups. She also had also used online directories, wikis, photo share sites (e.g. Flickr.com) and blogs at least once. However, she had never used some of the other Web 2.0 digital tools such as: Social bookmarking, web feeds, book sharing, computer conferencing, file sharing, YouTube, slide sharing or social spaces. Apart from web creation software, she was confident about tools she had used, and also with a number she had not previously used, such as, web conferencing, e.g., Skype, virtual worlds, e.g., Second Life, e-Portfolios, as well as digital audio and video. Interestingly, Bernice felt strongly that digital technologies enhanced her professional skills.

Attitude and confidence

Bernice's attitude was that although computers and other technologies were not always easy to master, she did not feel anxious or uncomfortable about learning to use them. She was ambivalent about how enjoyable they were, but still felt at ease learning about them - two important characteristics associated with self-efficacy for e-Technologies. When learning about new technologies, Bernice stated she was confident if there was someone to ask or if there was a lot of time to learn, but felt extremely unconfident if there was no-one around to ask, or unconfident working from a manual only. On the other hand, Bernice was confident in her ability to solve problems, and was not likely to give up quickly. However, she did not tend to put in a lot of effort trying to get technologies to work, as she preferred to ask others for help; if she spent extra time and it did not work then she had a tendency to get frustrated and annoyed at her lack of progress. This is illustrated by her statement in the pre-survey:

> I am impatient about the amount of time it takes me to work things out by myself – trial and error – I need guidance (Bernice, pre-survey).

Interestingly, Bernice perceived her overall confidence at the beginning of the project as average. On her blog, Bernice posted this comment:

> Thoughts - How computer literate am I really? Comfortable in current space, can bluff some others, but also am often completely bewildered. (Bernice, blog post.)

Goals

The goals which Bernice posted on the blog which she was using for the project were focused on some Web 2.0 solutions for her work, and although she was not confident with using them, she was interested in exploring some of the tools. For example, the possibility of setting up a blog suggestion box and an online photo history appealed to her. Plus she also wanted to find out how to use Smart boards having heard they were a useful presentation tool. A longer term goal was to look at a wiki solution to support her professional role.

Learning and dispositions

In the workshops, Bernice demonstrated a certain level of curiosity and creativity as well as risk taking behaviour in the way she approached her goals and achieved them. For example, when Bernice went about setting up her blog, she looked at resources about blogs on the Internet so that she could master blogs in general and find a solution which suited her purpose. However, it was apparent from one of her blog posts that Bernice was quite cautious, as she posted this about her progress in setting up a blog:

> …found settings so now allow visitors but not search engines. Is this being too timid? I take a long time finding out stuff (Bernice, blog post).

In the workshop sessions, Bernice alternated exploring tools and working on her blog. She was self-directed in her approaches and interacted with other participants both in the workshops and online. Bernice engaged in social networking with other participants as well by actively commenting on their blogs. The following comment which Bernice made in the focus group interview illustrates how important she regarded online interactions with the group.

> I found it was useful to look at what other people were doing - starting out there on their blogs stuff it was really good just to be able to see what other people had done, it was like is that a good model or not. And then to be able to get that conversation going – that sort of stuff (Bernice, focus group interview).

The creativity which Bernice demonstrated was associated not only with the way in which she set up her blog for the project, but also with the way she tackled the design of the blog used in her workplace. Initially, Bernice tried and failed to make changes on the blog set up for her work, previously, so she ended up experimenting on her project blog. She then had the work one changed based on her experiences, and re-deployed. This approach demonstrated quite a lot of flexibility in her attitude as opposed to giving up when her first attempt on the work blog did not work. Bernice was also creative in her "play" with a Smart board and generated non-teaching reasons for its use, to assist with brainstorming sessions and team meetings.

Other technologies which Bernice experimented with in the workshops were: Snagit for image capture, Quandary for web-based action mazes, Wimba tools for online conferencing, all of which were mentioned in the workshop sessions. When Bernice used Snagit to capture a photo for her blog and added it to the blog, and cropped it, she considered that to be good progress. Certainly Bernice demonstrated characteristics of persistence and the ability to problem solve. As well as trying out new technologies in the workshops, Bernice's curiosity regarding new technologies led her to be exposed to Second Life outside the project, and she went so far as to consider how a virtual world like that could be used in her workplace. This demonstrated that she had the ability to critically reflect about technologies in relation to her work. In fact, Bernice's learning style appeared to be quite reflective as demonstrated by her blog posts and the way in which she approached tasks during the workshops, and she would often spend time on her own after a sharing session working on her own, while keeping an ear on the rest of the group. Also Bernice became aware quite early on following an audio group session that she did not take charge of her own learning.

Another example of Bernice as a reflective learner was illustrated in a blog post, where she reflected that the finger-mouse and height of the Smart board would be a problem for users. Plus she wrote how she could see more creative ways to use the technology, e.g., split screens so more detail could be shown. A further reflection on Bernice's blog indicated that for her a significant change was the way in which her use of terminology had improved. She posted the following:

> The next time I read PC world, I felt like I knew what it was saying. That was because again it's the terminology and the language – that's the big difference (Bernice, blog post).

As well as demonstrating a level of reflective learning, and characteristics in tune with developing digital information skills and dispositions, Bernice managed to achieve her two main goals. She got the work blog set up and user tested it, and she played with the Smart board and planned for work use with staff. As expected from Bernice's progress during the project, her post-survey self rating for using digital methods to locate, retrieve, analyse and apply information rose to high. Bernice's familiarity with New Zealand and Maori contexts for information also increased. She also reported having more confidence in using digital technologies with information sources, particularly search engines, blogs, web conferencing, e.g., Skype, wikis, video sharing, e.g., YouTube, photo sharing and social spaces. Bernice also reported that she wanted to use social bookmarking, social spaces and file sharing more, and felt more at ease learning to use new tools, and was not worried any more about making mistakes. She was also using Web 2.0 more frequently than before. She had also changed her attitude towards trying different computer technologies and tools and now enjoyed doing this. She commented in the post-survey:

> Confidence in "playing" with new products online, familiarity with names in literature, seeing more possibilities for Web 2.0" self described as change. …My expectations of being able to use any digital information methods and tools is now extremely high. I have confidence in my own abilities (Bernice, post-survey).

In fact, Bernice's overall digital information literacy score increased by 65%, the highest of all the participants. As an example of where gains were made, Bernice indicated in the post-survey that along with increased confidence in using Web 2.0 tools she had also gained confidence in using Learning Management Systems, websites, and a range of software and was confident with only an instruction manual, something she felt unconfident in doing previously. She was also less likely to ask for help immediately and did not get so frustrated if there was lack of progress. All these characteristics point to an increased level of self-efficacy in using digital tools and approaches. In the focus group interview, Bernice said the following:

> Definitely feel more knowledgeable, confident. I don't care if I don't know now cos I can go out and find out. That's my attitude, whereas before I was a bit hesitant….I have to keep learning the lesson of patience with myself and my own ability to learn and then remember that other people have the same thing about having to process and learn (Bernice, focus group interview).

Dispositions and DIL

The type of dispositions which Bernice exhibited in relation to an increase in her overall confidence and increased level of digital information capability were multifaceted, and fit the profile of someone who is defined as digitally information literate. For example, by the end of the project, she demonstrated the ability to manage information by writing about what she was finding out on her blog, something she had never done before. She was able to apply her knowledge by creating a solution for her workplace – one of her goals. She said in the focus group interview that she had also gained confidence in using terminology, and in the workshops it was evident that she listened to what others were doing and wanting to achieve, an indication she was able to participate in sharing.

Additionally, Bernice said in the workshop sessions that she was going to take the Smart board idea further, another aspect of her ability to be creative. Also demonstrated in the workshops was Bernice's ability when investigating Web 2.0 tools to use in her workplace, that she was able to evaluate their suitability through reflection and experimenting, and would only use them if they added

value for the user. This latter characteristic indicates that Bernice was engaged in ethical use of information as well. In the workshops, Bernice worked methodically towards a digital solution for her workplace and demonstrated problem solving, the use of logic as well as inquiry.

In the focus group interview, Bernice said that she wanted to collaborate with the new network of folk from the workshop group. She found it useful to look at what other participants were doing and listen to their talk about it. She said:

> ... it was really good just to be able to see what other people had done, it was like is that a good model or not. And then to be able to get that conversation going – that sort of stuff (Bernice, focus group interview).

> have a "hand-held" first experience, then play with it on my own, knowing that I can ask for help if I get stuck (Bernice, blog post).

Bernice also intended to carry on applying her new found skills and was setting up an online network across the organization to carry on her work in digital information exploration and improvement. By the end of the project, Bernice's digital information literacy score was measured as 71%, close to the mean (73%) for her institutional group.

Summary of Bernice's case

In summary, Bernice demonstrated an incredible shift in her digital information skills and capability by the end of the project. She entered the project as a cautious information user with a low digital information literacy score, and by the end her pre-survey/post-survey score had increased significantly by 65%. Bernice used the project to explore a wide range of Web 2.0 tools and approaches and other technologies with the intention of using them in her workplace. Bernice was a reflective and inquiring learner who liked to share her experiences with others in the group. She had gained confidence in using technologies new to her, and left the project with a changed attitude with regard to digital information and confidence in her own ability. Bernice demonstrated several dispositions by the end of the project which can be attributed to someone who demonstrates digital information literacy.

In the next case, the participant's digital information literacy score also altered hugely by the end of the project, and there are several interesting reasons for this change.

Stewart: Case Two

Starting point

Stewart (pseudonym) was in the 46 to 59 age group, of European descent and had three years or more of experience with computers. He mentioned in the focus group interview (2008) that in the past he had taken great pleasure in being a "techno dinosaur". He also stated in the pre-survey that he had come to the project while engaging in part-time postgraduate study and commented that he was motivated by the realisation that he needed to develop his level of digital literacy. In the pre-survey he also said "I have generally learnt on a "need to" basis, but would describe myself as a rather timid developer in this area" (Stewart, pre-survey.) He felt that the time was right to develop new skills. He said:

> This opportunity has come at the right time for me and I look forwards to developing skills that I see as absolutely necessary, given the directions I wish to take (Stewart, pre-survey.)

In the pre-survey, Stewart rated his digital information skills as average and his traditional library skills as high, however he was initially unconfident overall in his use of computer based and Internet based communication and information. His overall DIL score of 41% was in the low cluster in his group. Specifically, Stewart's pre-survey showed that he was confident with search engines and library databases which he used at least once a week, but he was very unconfident, or unconfident with all the other tools listed. At the start of the project he reported some familiarity with email and word processing. His pre-survey responses showed that he wanted personal support and a lot of time in order to be confident in learning to use new technologies or tools. In this situation he also expected to experience problems and doubted his ability to solve them. Although he felt he was easily frustrated and would give up quickly if something did not work, he did say he was willing to put in extra time to understand what to do.

In the focus group interview, Stewart said:

> I was a bit intimidated by some members of the group because they seemed apparently so much more literate than me (Stewart, focus group interview)..

He also said that "initially it seemed quite chaotic" and that he got "mind boggled", but that he learned that he didn't need to try and absorb everything and that "I actually could soak up what I wanted to" (Stewart, focus group interview).

Goals and activity

Stewart had two goals. He wanted to have more confidence in online environments so that he could communicate and interact with others in ways previously unknown to him. In the pre-survey he mentioned being "excited about learning how to use other means." He also wanted to increase his competency in using basic applications. He recognised that was peripheral to the project and concurrently enrolled in another programme so that he could progress in that direction.

From only lurking in a discussion group Stewart moved rapidly in creating his online presence and in finding and organising information. However, underlying his shift was a cautious and responsible approach. In the focus group he reported that he first set up Google Reader so that he could receive "information on a regular basis." He then set up i-Google to "manipulate" that information. Next there was a statement indicating his move to use Google documents: "For a group to run a formal presentation that we are going to present in early January" (Stewart, focus group interview). His caution comes through in the following quote:

> ...it was funny because cowardice came out again for me. What I did was I have got two email accounts, I have got two Google reader things, I have got two i-docs and I have got two things so that I practice in one and then when I have got it right I go in to the other. I know that sounds a bit odd but ... I am still a little bit fearful, it is all still a bit out there for me so I make sure I have got something down pat before I send anything to anybody or before I involve anybody else in it because I wouldn't want anybody to be messed up by my inadequacy. I think I have got a bit of responsibility in that sense, you know, when I interact with others, to interact in a competent manner. (Stewart, focus group interview.)

These thoughts fit with other comments he made in which he formulates a definition of digital information literacy which begins with technical aspects, then enlarges on that to say:

> It is being able to do it efficiently and effectively and I think that one of the most important things for me that I have realised is that there is an ethical component to being literate (Stewart, focus group interview).

He illustrates that point by talking about the norms and traditions of sites and his obligation "…if I join a particular group then I am bound by the rules of that group" (Stewart, focus group interview).

While most of his comments were positive he also experienced frustration particularly with online interaction when attempting to communicate "and they don't choose to interact". An example of that was within the FaceBook group set up by the participants. At the other end of the scale, Stewart found online groups could open up new opportunities. His study field is one which does not engage large numbers of people, but he was able to report that:

> I joined an online research group which was one of my aims to join and that has absolutely taken off in the sense that I am interacting with people that I have only ever read about…(Stewart, focus group interview).

Learning and dispositions

Stewart's approach and responses to learning opportunities within the workshops are of interest. He claims to have not interacted within the group, but to have " definitely used the skills I got there to interact in a much wider group, but a much more select group, I suppose personally chosen" (focus group interview). However, facilitator observations noted that he did communicate with others, especially on a one to one basis and on one occasion spent most of the workshop engaged in stimulating discussion with a fellow participant that spanned technological possibilities and ethics as well as research approaches. The benefits of face-to-face engagement are reflected in Stewart's words

> ...one particular person I did find particularly helpful within the environment was someone that showed me – not to be fearful, helped me to understand that it is okay to be a bit sort of left footed and stuff like that….

He also saw time management benefits of the workshops and appreciated an outside facilitator's approach.

> I think one of the biggest pluses for me in being part of the group was that I committed myself to a two hour period where I was almost forcing myself to be involved in something where I might find something else to do (Stewart, focus group interview.)

> I found that a really stimulating learning environment because what L started with was a question and consequently everybody fed in to the question so you could develop your own understanding as it went along (Stewart, focus group interview).

In this group there was another participant who reported experiencing distressing physical symptoms which she connected with her feeling of inadequacy in using computers. Stewart related to her experience by saying:

> I too suffered those sort of physiological reactions with the environment that I was going in to and consequently I just didn't go in to them, I only went in to them when I had to. So probably the lifelong learning for me has been the notion that change is inevitable.... A lot of the traditional methods that I have used with my education don't seem to apply that much with the new sort of speed of accessing and the Internet and stuff like that so I have had to change a bit about the way I think I learn, about the way I set goals and stuff like that. (Stewart, focus group interview.)

Stewart was observed to be open to learning about new strategies and tools. He was strongly purpose oriented and applied what he learned within the specialised online environments where he was interacting. He claimed in his pre-survey to need a lot of personal support, but he found much of what he was needing online and abandoned his "techno dinosaur" attitude which he had previously assumed with "great pleasure". He also said in the focus group:

> I realised that that in itself is a limitation to learning and that when you need to know something, there is always somewhere you can go to find out what you need to know. ...one of the big things for me was learning that if there was a particular process, then there was a video which showed you how to do it and the video is for the idiot and I am the idiot but it didn't make you feel like an idiot…. It has definitely taken me to a new level. (Stewart, focus group interview.)

This change was reflected in Stewart's shift in overall confidence in the post-survey where he rated himself as confident. The increase in confidence was associated with a 65% increase in his DIL score. This largely was derived from exposure to a wide range of Web 2.0 tools which he reported using with some frequency and mostly with confidence. It is worth noting his perceived personal characteristics were resistant to change. Stewart still expected problems and doubted his ability to solve them when learning to use new computer technology, or an online tool. There was a small positive shift in his rating of his own persistence and he was slightly less likely to ask for help straight away, but a little more likely to ask someone else to do it for him, or fix the problem. All this information came from Stewart's responses in the post-survey.

Stewart, did not find the ongoing reflection suited him. While he talked and communicated via email with the facilitator, he did not record very much. This was in contrast with the focus group where he participated fully and that source provides most of the evidence of his learning and thinking. He has ongoing goals and has developed awareness of Web 2.0 potential and possible communication and interaction limitations. Stewart's future direction is illustrated by a comment he made in the focus group discussion:

> Where I would like to take it to, is that I would like little communities, little information communities where I can have specific goals and objectives. I think it is too vast to use just haphazardly because people get bored and lose what the focus is…(Stewart, focus group interview).

Hence online interaction was important as a future direction for Stewart, and an experience he found helpful in the project. Although he interacted online with others, it was mainly with specialist groups rather than with the participants in the project. Stewart's dispositions which aligned with digital information literacy were primarily related to his ability to reflect evidenced by the way he said he thought things through after the sessions to bring order to chaos, his confidence, and the logic he demonstrated in achieving his goals. Sharing is implied because he took what he was learning and shared it with the national group which he got involved with and they started using Google docs for collaboration. Stewart was not a risk taker and that is evident from his cautious approach to working with the new tools. He became much more able to solve his own problems once he learned that he could go online and use things such as Youtube videos. He also exhibited an element of inquiry when accessing the online forum in his specialist area. A point of difference is that his interest was not in the technologies themselves but in what they could enable him to achieve.

Summary of Stewart's case

Stewart was another participant who like Bernice made significant gains in his digital information literacy skills and capability as a result of his engagement in the research project. He entered the project regarding himself as lagging behind technologically and he was a timid digital user. He was motivated to develop his level of digital literacy to assist him in his postgraduate study. Initially on entry he stated in the pre-survey that he was unconfident overall in his use of computer based and Internet based communication and information. However, he made a shift to rating himself as confident overall in the post-survey at the end of the project, and demonstrated a 65% (similar to B) increase in his DIL score. He reported an increase in use of a wide range of Web 2.0 tools and he did this mostly with confidence.

An analysis of Stewart's post-survey personal characteristics indicated he was still however resistant to change, and he still expected problems and doubted his ability to solve them when learning to use new computer technology, or an online tool. There was a small positive shift in his rating of his own persistence and he was slightly less likely to ask for help straight away, but a little more likely to ask someone else to do it for him, or fix the problem. Stewart preferred to share his learning via email or dialogue rather than record his thoughts on a blog or in a journal, and did this mainly through discussion with the researcher and also with others in the focus group interview. He exhibited several dispositions associated with digital information literacy such as reflection, confidence, sharing and logic.

Similarities and differences between Bernice and Stewart's cases

One of the main similarities between Stewart and Bernice is their starting points with digital information literacy, that is low, and the increase in scores they obtained as a result of the project, 65%. However, Bernice came into the project perceiving herself as having average confidence with using technologies, although she was cautious, whereas Stewart stated he was not confident and timid. By the end of the project, both participants were much more confident in using Web 2.0 tools and both had plans for ongoing usage. Bernice was interested in using the tools for her workplace, in contrast to Stewart who was looking for study solutions. With regard to recording the learning achieved in the project, Bernice was more adept and interested in doing this than Stewart, and she also had more online interaction with other participants in her group. Stewart on the other hand, mainly interacted with online groups in his areas of interest. Sharing information with other participants was important to B during the project; however Stewart mainly exchanged ideas with other participants in the focus group discussions. Another attribute of importance which stood out was in the ability to solve problems as they arose; Bernice had improved in this area whereas Stewart was still showing signs of insecurity in his abilities.

In contrast, the next participant who is described ended up with a lower DIL score at the end of the project, however her score on entry to the project was relatively high in comparison to other participants.

Case demonstrating the least increase in DIL score

This case was chosen to illustrate a participant whose digital information literacy score at the end of the project was less than those calculated on entry to the project.

Sandra: Case Three

Participation in the project was beneficial for Sandra in many ways which were much more important than measures of her DIL score.

Starting point

Sandra was a full-time student of European descent in the age range 21 to 30 years who had three years or more computer experience. So she was much younger than the other two participants whose cases were previously described. Her initial DIL score was reasonably high (73%), and this decreased by 2.42% by the end of the project. In the pre-survey, she demonstrated technical aptitude when she came into the project, as she commented she was feeling reasonably confident about her digital information skill level, and rated herself as having a high level of skill in using information technologies. Sandra also stated something about having the "ability to work through whatever problems arose in the process of working with new tools and programmes", therefore regarded herself as able to problem solve. Sandra responded in the pre-survey that she was a regular and extremely confident user of most of the digital tools listed (at least once weekly), except for online books, file sharing and presentation sharing. However, Sandra did identify the need to use a RSS facility, e.g., Bloglines, more to make it easier to obtain information, and linked to low or no usage of tools were lower levels of confidence. Interestingly, Sandra stated in the pre-survey that her level of skill in using traditional media such as libraries was very low.

Unlike others in the project, in her group, she indicated in the pre-survey that she was only somewhat moving into situations requiring digital information literacy skills, and did not see a need to develop her digital information skills. This latter rating may have been related to her role as a student, who believed she had less control than a lecturer to develop skills, or it may have been due to her existing high level of digital skill. In fact she said she felt she was "confident using digital information gathering for further application to studies …" (Sandra, pre-survey).

Also indicated from the pre-survey were Sandra's beliefs about learning to use digital tools which were that she was confident, at ease and not worried or anxious about their use, all indicators of a high level of self-efficacy. She also said she enjoyed learning how to use digital tools, a sign of engagement, and rated herself as extremely confident in her ability to learn new computer tools knowing, "that all information would be available it would just be a matter of applying it which would be relatively straight forward process" (Sandra, pre-survey). Sandra indicated that she would just move through each tool until she found the answer or support she needed which demonstrated the use of logic, a disposition attributed to the digitally literate person. Sandra was also a persistent and motivated learner, and tended to spend time trying to understand a new tool.

Sandra's initial blog entry suggested that she liked to interact with others. She said, "I really liked the emphasis on skill sharing and helping each other to learn" (Sandra, Blog). Sandra also demonstrated aspects of recognition about her abilities: "not being aware of these resources in the first place could be preventing the ease of my digital experience", and the ability to reflect about her level of curiosity and flexibility: "I tend to just work with and adapt the things I am currently using or aware of"(Sandra, Blog). She did this, rather than to search for new tools that may be better suited to the purpose of the task and this was mentioned in her Action Reflective cycle further on which shows the learning process undertaken by Sandra (Figure18). In the first workshop, Sandra set goals for herself.

Goals and activity

Sandra listed the following starting goals on her blog about what she wanted to learn:

1. work with audio editing tools
2. use visual editing tools
3. find information online about new or different tools that are available to enhance the digital experience.

However, these goals changed as Sandra got into the project and the third goal was extended and was the main one she focused on, therefore, her goals which she wrote on her blog became:

1. Find out about all sorts of different tools and programmes available so I can utilise them in future projects as the need arises;

2. Find a way to have a constant inflow of information from the Internet to help inspire my art practice;

3. Find a way to keep all information in the same place in an organised and easy to access manner. (Sandra, blog post.) Sandra illustrated her change of approach with the following diagrams posted on her blog. She said:

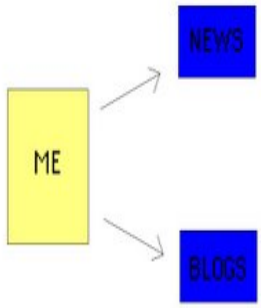
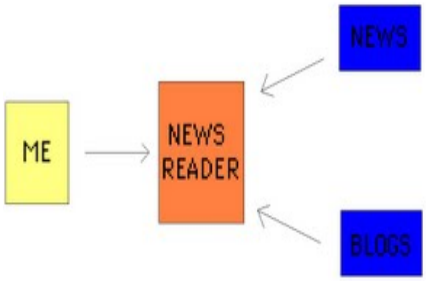
"So instead of doing this:	I will now do this:" (Sandra, blog post)
	

Figure 18: Diagrams posted by Sandra on her blog to show how her approach to digital information changed.

To achieve her goals, Sandra demonstrated a lot of self-directed activity, and sought creative ways to record her learning – deciding on a blog which matched her active, visual learning style which was also reflective. Sandra sometimes used her blog to record her goals for the session, and at times made notes on there about how to use various types of online applications, e.g. setting up an RSS Feed using Bloglines as her news reader. Sometimes she recorded her evaluation of an application or website she was exploring on her blog; she based this on self-identified criteria, and wrote this about using Animoto, a video creation and editing web application:

> I found that the site had clear instructions with an easy to navigate step by step system which made putting together the animation a really simple process. … I don't think that I would use Animoto again in the future as i wasn't a big fan of the final presentation that the Animoto engine chose for me. I did have the option however of re-submitting my video for a re-mix….I found the lack of decisions I had in the final presentation of the show very restricting. (Sandra, blog post.)

Thus Sandra was capable of evaluating digital tools she was trialing. Sandra was also aware of finding ways to be more efficient with using information, and as such she was willing to share and interact with others in the group as indicated by an extract from one of her early blog posts:

> From today's discussion I have learned that interaction and discussion with others is going to be the fastest way to access information about new resources (Sandra, blog post).

Sandra not only interacted with the group members, but also sourced information from her flatmates, posting on her blog, “I found out about the idea of RSS feeds from my flatmates when I was discussing with them ways to constantly be accessing new information on the Internet” (Sandra, blog post). Sandra was logical in her approach to information seeking and systematically recorded on her blog the actions she intended to take to meet her learning needs. She also became strategic in her approach, using the workshops to, “grasp[ing] a basic understanding of what these tools and programmes could do instead of experimenting with them … unless I had an immediate use for them”. (Sandra, blog post.)

Sandra also explored a lot of new web applications and tools, and demonstrated risk taking in the tools she chose to try out. For example: Animoto (video creation), Slideshare (presentations), News readers, e.g., Bloglines, iGoogle, Google documents, Wikieducator (open education wiki), blogging, Camtasia and Camstudio (screen capture software) and webconferencing, e.g. Elluminate.

Learning and dispositions

In this section, the learning demonstrated by Sandra is described within three categories: Knowledge, Skills and Attitudes. The diagram of her Action Reflective cycle gives an overview of the process she undertook.

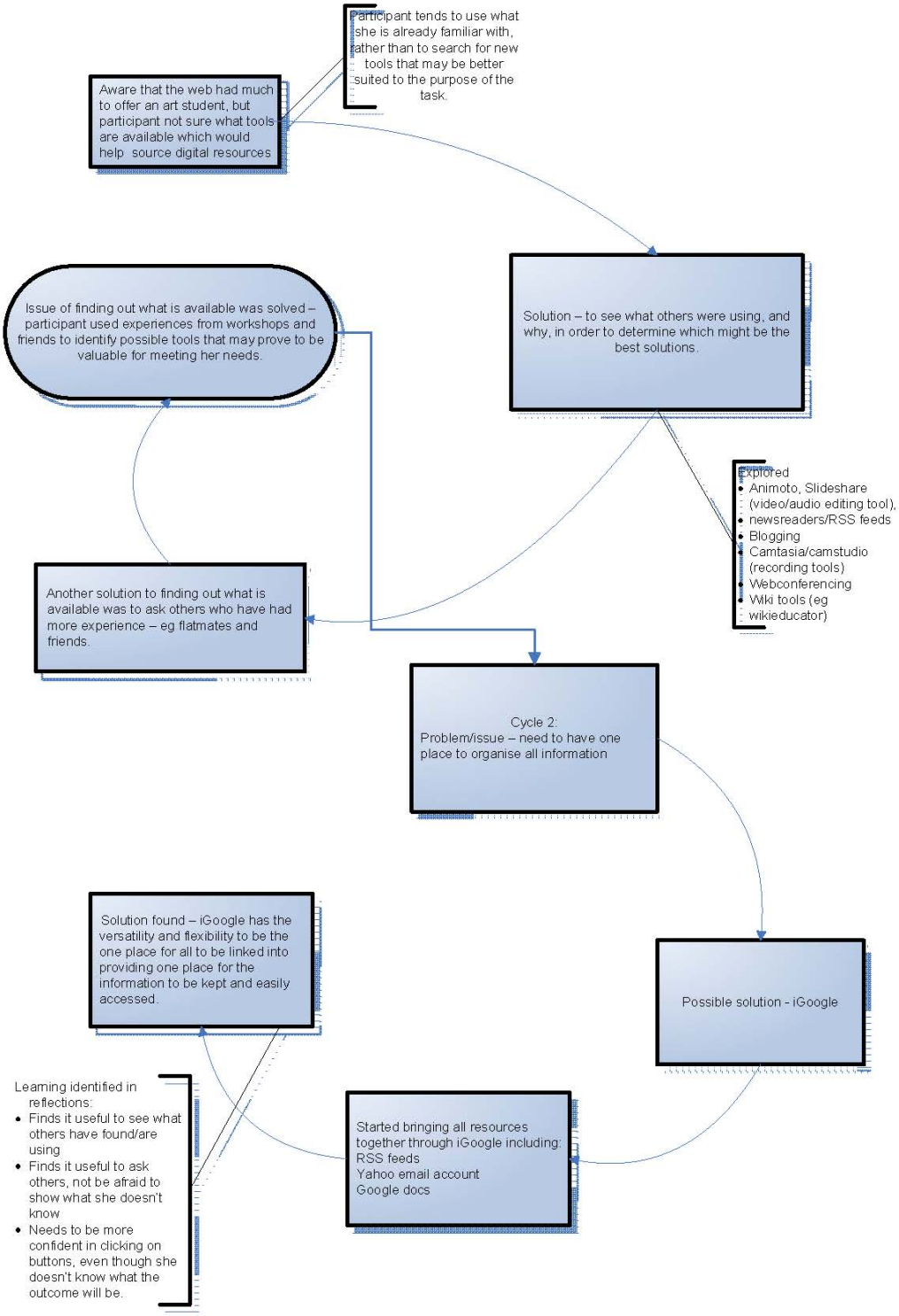


Figure 19: Action Reflective cycle illustrating Sandra's learning process for digital information literacy.

Through reflection on her progress towards achievement of objectives, Sandra was able to identify the issues she had with regard to digital information and was able to find ways of solving these. For example, she posted on her blog:

> By this point I had realised that while being able to access and utilise all of this information was really great I was slowly losing my grip on it all [evaluate]…Luckily [the researcher]

> mentioned to me the idea of iGoogle and gave me a brief overview of how it all works. So far this has been the perfect solution. (Sandra, blog post.)

Sandra learnt to ask for assistance as part of her information seeking approach. She said this on an email to the group:

> As always the quickest and easiest way to learn how to do new things with Internet based programmes has turned out to be asking. Thanks for your emails guys! (Sandra, DILOP email Group.)

Sandra started using Bloglines to manage the information she sought, demonstrating dispositions of problem solving and recognition as illustrated by:

> One of my main problems with finding information on the Internet is remembering where I got it from and then remembering to go and check for updates to those sites (Sandra, blog post).

Sandra said in the workshops that she used iGoogle as a central place to store passwords, and to jot notes, from which she later created blog posts. She also used it as a news reader.

Although a confident user of technology, confidence for Sandra appeared to be higher when she was using something she already had some experience of, or could relate to something she had done before. However, Sandra noted that she did have, "a fear of clicking on buttons when I don't know what the outcome is going to be! In the future I will endeavor to be a braver clicker as not doing so is something that prevented me from far quicker subscription to interesting bloggy bits of information" (Sandra, blog post).

Achievement of goals

This post illustrates that Jesses did have skills of recognition and evaluation, important abilities for handling digital information. Sandra did achieve her goals, and her process was interesting. Although she set some initial goals, she adapted these so she could investigate what others were finding, then ended up trying them out, evaluating their use – for now or later, and found ways of recording how to use the tools, and how to find them again.

Changes to digital information skills and capability

As a result of Sandra's participation in the project, she demonstrated changes to her knowledge and attitude, but not to her DIL score though her breadth of skill for using digital technologies for information retrieval was extended. She did this by setting up iGoogle as a central place for storing information and incorporated Bloglines to bring information into her space. As previously mentioned, Sandra's final overall DIL score in the post-survey decreased slightly as well.

Sandra's knowledge of how she learned, as illustrated in her blog posts and observed in the workshops, assisted her to identify obstacles in her own thinking that have prevented her from learning in the past, so she was clearly able to self-evaluate. By being in the project, Sandra, according to the post-survey, had expanded her knowledge of digital tools and applications for both current and future use, and as such exhibited technical aptitude and the ability to access information efficiently.

Sandra also had a baseline of understanding of how to use the tools. When exposed to new tools (e.g. Elluminate), she didn't appear to be overwhelmed or challenged stating, "seemed quite familiar as all of the functions are variations on things that I have already used so it didn't seem like a

daunting programme to learn how to use" (Sandra, blog post). This was an indication that Sandra had characteristics of flexibility and engagement.

At the end of the project, Sandra felt more confident to "seek help when needed for difficult tasks", and stated that her confidence had increased due to "using digital resources on a regular basis" (Sandra, Post survey). Sandra was also more motivated to experiment and try new tools as a result of being in the project. Sandra could not only articulate her problem, but was aware that there might be a range of solutions, and that she could either try to solve the problem herself (using help resources or trial and error), or she could ask for assistance from others. She said on email, "Bloglines is still new to me, it isn't the first solution that springs to mind when faced with these challenges"(Sandra, DILOP email Group).

It was a bit confusing because Sandra in her pre-survey rated herself as overall extremely unconfident in the use of computer-based and Internet-based communication and information. However, this rating did not match how she described herself in other sections of the survey, for example, she selected a range of Web 2.0 tools with which she felt highly confident. However, she stated she was unconfident with tools she had not used. Perhaps Sandra's uncertainty about what the project entailed may have led her to select that she was extremely unconfident overall. In response to a question about her personal characteristics in learning to use new technologies, Sandra stated: "Depends on mood at the time as to levels of frustration experienced with new things"(Sandra, pre-survey), and as mentioned previously, Sandra did appear more comfortable and confident when using tools with which she was familiar. Also in the post-survey, Sandra stated, "…felt I came into this project feeling reasonably confident about my skill level" and this suggested that perhaps her overall confidence was misrepresented by her response.

Confidence in the use of online library databases improved as had blogs, newsreaders, use of web conferencing, e.g., Elluminate, Google documents and presentation sharing (SlideShare). Changes in confidence level for Sandra appeared to relate to which tools Sandra used in the workshop. For example, WikiEducator and Elluminate, Animoto etc. She noted in the post-survey that sometimes learning new things was not easy. However, she stated that she realised there was a correct way to do things, and that she just had to learn how.

Sandra was clearly challenged by some of the tools she was exposed to in the workshops as the itemized self-efficacy scores regarding her personal feelings about her confidence in the use of technologies were lower in the post-survey. There was also no clear pattern as to why some of her ratings on her personal characteristics when learning new tools had changed. It was observed by the researchers during the workshops that in some instances, being exposed to new tools or new ways of doing things increased Sandra's awareness of what she didn't know, or was not sure how to manage. A more grounded picture of her abilities and confidence emerged in the post-survey.

As a consequence of the project, Sandra gained insight into strategies that she had not used in the past and their impact on her learning, and she expressed this on her blog:

> I soon realised that if I was going to get anything useful out of the workshop I was going to have to swallow my pride and ask! This is a problem which I don't often encounter as I generally have a pretty good idea about what is going on in most situations, but on reflection I can see how in the past it is something that has held me back. (Sandra, blog post.)

There were certainly a number of changes in Sandra's knowledge and attitude, and few indicators that her level of skill in processing digital information had changed, though she did try out a large number of new tools which were previously unfamiliar. Although her overall DIL score dropped a miniscule amount, the overarching outcome for Sandra was very positive.

Summary

Sandra came into the project with a high level of confidence and frequent use of a range of digital tools. She openly outlined her progress in the project on a blog, and interacted online with other participants in her group. Sandra's main goals were to become more proficient at accessing new technologies and information and also in managing information; she certainly achieved these goals. She was an engaged participant, who recognized her information needs, and was able to work in a self-directed, reflective and inquiring way towards finding solutions. She was also aware of the need to be more efficient in using information. Other dispositions which Sandra demonstrated emerged from the way she would 'play' with a range of tools until she found what she needed - logic, persistence and motivation. Sandra's overall DIL score decreased slightly, however her increase in knowledge and her change in attitude towards more flexibility and innovation were very evident.

Lastly two cases are presented to illustrate the progress of participants who changed in a way which represents the status quo, and they were chosen to illustrate some interesting processes which participants engaged in.

Cases demonstrating an average increase in DIL scores and interesting aspects in DIL skills and capability

Four cases are outlined in this section, and each one has a different focus. There is a description of a participant (Carol) with a low incoming level of confidence for digital tools, followed by a case about a very confident digital information user (Bernard). Two cases, Liza and Valerie are presented diagrammatically to show their action research cycles.

Carol: Case Four

In the first case, Carol was rated with a very low DIL score (31%) on entry to the project, and made an upward shift of 54% in her final score plus she demonstrated a remarkable change in her self-efficacy and attitude.

Starting point

Carol was an academic staff member of European descent and in the 46 to 59 year age group (pre-survey) who said on her blog that she regarded her digital information literacy as low on entry to the project, "I was among those who laid claim to being the most digitally illiterate (Carol, blog post). Partly as she said in the workshops during the project that this was due to not really knowing what digital tools were out there to use. Although, Carol stated in the pre-survey that she had three years or more of experience with computers, she also indicated that her use of the Internet was infrequent.

Also on the pre-survey, Carol evaluated herself as having a low level of skill in digital information, and appeared to lack confidence in all digital tools but email and Skype due to her unfamiliarity with the others listed. Carol also said in the Focus Group how she knew she didn't have good literacy in digital information. Carol's responses in the pre-survey indicated a low level of self-efficacy, for example, she expected to have issues when learning new digital tools, and was worried about making mistakes. Carol described herself as losing patience quickly, that is, she was not persistent and she said on her blog that she was "technophobic" (Carol, blog post). In some group email communications Carol described herself as getting frustrated and annoyed with her abilities, and shameful when unable to do what she perceived to be simple tasks, e.g., blog posting with an image inserted.

Carol recognised she had a need to develop her digital skills, as she indicated in the pre-survey that she was moving into situations where these skills were required. This lack of knowledge and skill was reflected in the digital tools she said she had never used or had used at least once, e.g., blogs, web feeds, social bookmarking, computer conferencing, document sharing, email discussion. Carol stated that she was slow when using technologies. Carol said in the first workshop that she felt motivated to learn new technologies and was excited to join the project, and demonstrated a willingness to engage throughout the project. When prompted by the first workshop session discussions, Carol showed some awareness of ethical issues (as she asked who owned and used data that was made public), although she did not appear to evaluate or apply this new knowledge to other situations.

Goals and activities

Carol set goals for technologies where she recognized she had a knowledge or skill gap. For example, when she saw a Smart Board, but did not know how to use it, and knowing EndNote existed and might be the solution to assist her and her students with academic writing. Therefore she set out to learn about these technologies during the project. Carol also recognised the potential for networking with others, and indicated during the workshops an awareness that there was a potential for interaction, or sharing with others.

Carol accessed a staff trainer to have a Smart Board Training session, as she stated she learned best from demonstrations. Carol interacted, showing willingness to seek information from others in the group. In addition, Carol also attended almost all workshops, being exposed to a range of tools shared by others, and as a result explored RSS feeds selecting Bloglines.com as the site for this. She also trialed Animoto.com, and used iGoogle to keep track of passwords, and for gadgets which would help her organize information. Carol also created a blog for her reflections, and as part of this process learned to add photos to the blog site. The other technology which Carol learnt about was Zotero which she discovered outside the project.

Learning and dispositions

In this section, the learning demonstrated by Carol is outlined in three areas: Knowledge, Skills and Attitudes. The diagram of her Action Reflective cycle gives an overview of the process she undertook.

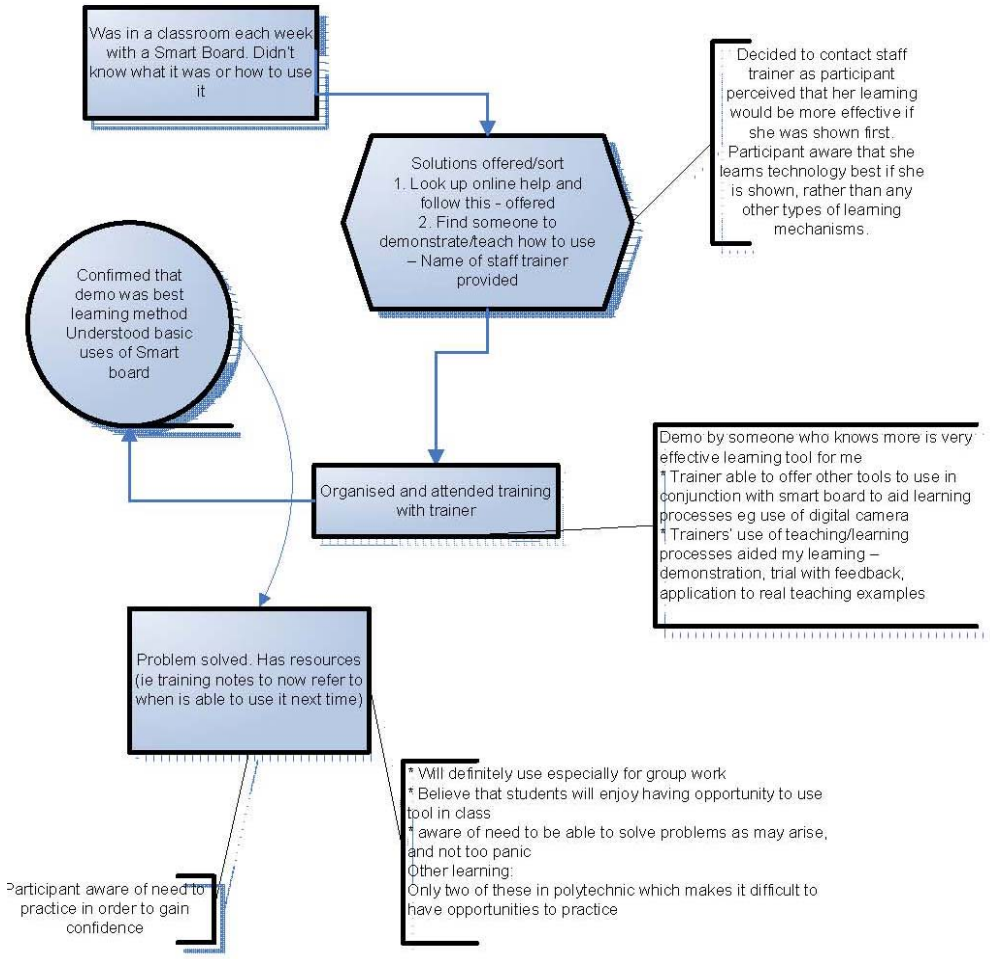


Figure 20: Action learning cycle for Carol.

Carol explored a variety of technologies most of which had direct relevance to her work, and these included how to adjust the volume on a PC, basic functions of Smart Board, and recognition of how tools such as Notepad and digital camera could be used in conjunction with a Smart Board. Plus in the focus group interview, Carol stated that she used Flickr.com for her images a lot since participating in the project.

While learning, Carol interacted in different ways, in addition to the workshop conversations and email communications she had with colleagues and facilitators in the workshops. For example, she interacted with a trainer when learning about the Smartboard. Through this process she raised questions about how to transfer from tools she currently used (such as paper and pen), to digital tools. The trainer was able to provide Carol with answers which were relevant to her immediate needs, and Carol said in the focus group interview that she recognized the value of the face-to-face and one-on-one learning process as this was her preference as opposed to online learning. However, Carol also accessed online help (from her son for Skype) when it was needed and there was no other alternative.

Carol's beliefs about her skills changed at the end of the project compared to how she felt at the beginning of the project. Consequently at the end of the project, although she rated herself as having a low level of skill in using digital tools for accessing material, it was slightly improved, and she ended up with an average level of skill for using traditional information skills for accessing material instead of

low skill, stating that she was “more inclined to keep trying now” (Carol, focus group interview). Carol showed characteristics such being able to persist and to give herself sufficient time when learning about new technologies.

Carol evaluated her personality in an early blog post as inward looking and scared to expose herself to the public eye. She said this about her attitude to blogs:

> I feel that I’d not want to have a blog, being such an introvert and a bit of a wimp. The out-there-ness of it is interesting. I am not confident about even commenting on someone’s blog. I don’t know how to create a blog, but the question is, do I want one? (Carol, blog post.)

Carol reflected on her blog about prior poor experiences with mastering technology and some of these experiences were at times reiterated in the workshops. Engaging in process of learning a new tool (blogs) brought out into the open some of Carol’s beliefs about herself she expressed during a workshop when while having difficulty creating a new blog post: “web stuff is not me” …“I’m a technophobe” …“is frustrating and makes me feel stupid!” However, at other times when Carol reflected on her experiences in the workshop, at times she felt she was getting a little further, and although at times she was feeling frustrated and discouraged, she said she was gaining motivation from somewhere to keep persisting. It was evident that Carol was able to problem solve an issue during the workshops, and at home with assistance from her son at a distance. Additionally she continued to use interaction and to access others to assist her problem solving all through the project.

Carol increased her knowledge of the value of blogs, from being exposed to others’ reflections, and in the focus group interview she showed curiosity about the possibilities of blogs for increasing participation in journal writing. Carol also reflected during the focus group interview about how the project helped increase her awareness of what was available. Carol also said she had been evaluating her PowerPoint presentations against information she received in the project. When sharing her learning with others in her School, Carol said during a workshop that she discovered that many were using the tool of Facebook that she was just discovering. Carol was also made aware during the workshops about issues related to online use and took part in a discussion about privacy and social networking and using images on blogs which raised awareness about copyright licensing and alternative options such as Creative Commons licensing.

Achievement of goals

Carol reflected on her blog about what she had learnt about learning to use technology in the project stating “I need to practice all of these [tools]. I find I need to repeat things several times before I feel confident” (Carol, blog post); this indicated she was evaluating herself. Carol also reflected that she was more likely to try motivation/engagement and on the post-survey stated that she had increased her knowledge of what was out there. Carol reflected that she may not have ever tried the tools, if it had not been for the group process. She also said the group was a motivator for her.

Carol’s perception of her ability to master the tools changed and is illustrated by her stating that she was “more inclined to keep trying now” (Carol, blog post). Tool use and/or familiarity had also changed, and in the post-survey, Carol indicated she was using four tools (web feeds, video sharing, email discussions, computer conferencing) which were previously ranked in the pre-survey as never used. This was in addition to her goal of learning more about how to use a Smartboard and End note (which ended up changing to an exploration of Zotero).

Although not a specified as a goal, confidence in using some tools improved over the course of the project as indicated in the post-survey. Carol rated herself as confident in using two tools (online databases and Internet search engines), and her confidence levels improved for four of the tools she

used in the project – blog, computer-conferencing, video sharing, RSS feeds. However, she continued to lack confidence in almost all tools identified in the survey. Carol's self-efficacy (confidence, ease of learning, anxiety in using new tools etc.,) in the use of information communication technologies (ICTs) changed towards a higher level of self-efficacy (SE) (pre-survey - 35% to post-survey 48%), although Carol continued to rate the learning process as not easy.

She said in the focus group interview: "This project has been a huge eye-opener for me. Thank you for all the help I have received" (Carol, focus group interview).

There was evidence that Carol had moved some way towards achieving her original goal of increasing her confidence in using tools. At the outset Carol said: "I am phobic, and quickly lose patience when things don't work for me. I am very slow too" (Carol, pre-survey) but by the end of 10 workshop sessions she said in the post-survey: "I am more likely to try something and I have increased my knowledge of what is out there" (Carol, post-survey).

Changes to digital information skills and capability

During the Smart Board training, which she had organized herself, Carol was exposed to a number of functions and, she posted on her blog that found the following processes were helpful for her learning: being shown, then trying herself, having helpful suggestions offered, and being shown or given the answers to the problems she raised. However, one of the barriers to ongoing use of the technology was access to the technology. The polytechnic had only two boards, both of which were in classrooms so could not be easily accessed for practicing on. Plus Carol's second semester teaching was not timetabled in the rooms where the board was located.

As well as barriers associated with access to a particular technology, Carol identified individual barriers; she believed as indicated by a blog post, and mentioned through communication in the workshops that she was "technophobic", and was aware she was ignorant of the possibilities (Carol, blog post). Also a barrier was her unwillingness to take risks ("trying things out and not worrying if they don't work the first time") (Carol, blog post). Another barrier to learning was inferred in her statement "…am slow learner where technology is concerned" (Carol, blog post). .

Carol demonstrated some changes in her attitude to approaching the use of an unfamiliar technology. A summary of the change is compiled from the variety of methods used to collect data. During the workshops Carol demonstrated that she was motivated to try new tools and said she would continue to do so in the future, and she developed the ability to access resources she needed to learn about a particular technology, e.g., Smart Board manual and trainer. By the end of the project, Carol recognized that she had a need for lots of practice before using a technology either for herself or for her students so she could feel confident. Carol demonstrated that she was able to engage in anticipatory problem solving (or reflection for action), and as part of that could identify potential problems and find effective solutions.

Another technology where Carol exhibited a change in attitude was Skype. She wanted to use it to communicate with a family member but was having a few problems at home. However, she persisted in downloading and solving problems with using Skype, and gained increased satisfaction through having a successful experience. During the focus group interview Carol reflected on the value of the research project for her successful outcome with Skype by saying, "…marginally more prepared to try things" (Carol, focus group interview). She became aware that determination could "kick in", even when she was struggling, and this enabled her to "fiddle" and solve the problem (Carol, email post). She also mentioned that if reluctance to engage was to do with lack of trust, then increased trust should increase literacy (Carol, email post). Throughout the project, on her blog and in the workshops, Carol continued to acknowledge her lack of knowledge and skill with tools, e.g., RSS feeds.

Lifelong learning

Gaining new skills and continuing her learning was very important to Carol. In the future, Carol said in the focus group that she wanted to "continue with my more open mind and keep adding to my skills" (Carol, focus group interview) and that she felt motivated. She also mentioned how what she was learning was helping her work. During the workshops she said, "so much of what I am learning about through the DIL group has a direct impact on my work", and this was in relation to seeing a web-conferencing tool called Elluminate used. She also had a plan for using Elluminate with clients in her workplace.

In the focus group interview, Carol reflected on the learning she had gained about blogs, and wondered about the application of these in her courses as an alternative to a written journal. She said, "Yes, I think my attitude is more positive so a little bit more confident, but I am still reluctant to get in there and practice. If something doesn't go well straight away, I still have to talk very strongly to myself really" (Carol, focus group interview). So although there were changes, there was still some work for Carol to do to raise her digital information literacy skills and capability, but she had more awareness of how to do this and recognized the need to keep working on it as well.

Summary

Carol entered the project with low digital information skills and low self-efficacy in using information communication technologies and she was aware of her deficits, not only in her level of skill but also in her ability to problem-solve and try out new technologies. She also believed she was slow to learn. She claimed she was very cautious and lacking in confidence, and considered herself one of the most digitally illiterate people around. Additionally she was very unaware of the technologies which were available.

On entry to the project, Carol was confident in using email and Skype and unconfident with using all the other tools listed in the pre-survey. During the project, Carol tried a number of new technologies, e.g. RSS feeds, Animoto, Zotero, EndNote, Smart Boards, iGoogle, Flickr.com, and set up a blog and posted regularly. During the project, Carol was enthusiastic to learn, and attended the workshops regularly, and as well as interacting regularly with the group in the workshop sessions, she also interacted on participants' blogs and on the email forum. Carol's self-efficacy in using technologies increased by the end of the project, and she increased her DIL score significantly, moving from a starting score of 31% to a 47% final score.

Carol's confidence levels improved for four of the tools she used in the project – blog, computer-conferencing, video sharing, RSS feeds. However, she continued to lack confidence in almost all other tools identified in the survey. Carol's goals were modest in terms of tools, and she set out to learn about Smart Boards and referencing software, e.g., End note or Zotero, and to build her confidence in using web tools. She made the most of the opportunity to interact with others during the project and used the workshops, blogs and email forum as way s to communicate and share with others in the group. Carol was very pleased with her achievements in the project and was keen to keep learning new technologies which were going to help her in her work.

Bernard: Case Five

Bernard, a Tangata Whenua student participant discovered the advantages of the digital environment for his study purposes and his future plans as a result of taking part in the research project. His purpose for digital information literacy became not only one of personal growth, but a drive to share what he had learned for the good of the wider community with whom he was in contact.

Starting point

According to the pre-survey, Bernard considered himself an infrequent user of the Internet. He felt his level of skill with digital information retrieval was average, but familiarity with traditional and Maori/NZ contexts was high at the beginning of the project. However he recognised that it was very likely he was moving into situations requiring digital information and that he needed to upskill. He was a little lacking in confidence as he felt unfamiliar with digital tools and methods, beyond the use of email and the more traditional database searching he was familiar with from being a student. He had used blogs, online conferencing and email discussion groups at least once. He had never used social bookmarks, book-, file-, video-, photo- or slide sharing sites, nor any kind of social spaces. Bernard's self-efficacy in using information communication tools was high and in the pre-survey he selected characteristics in line with this. For example, he felt at ease learning computer technology, was not worried about making mistakes, was not anxious and enjoyed trying out tools. He felt strongly that using such tools enhanced his professionalism.

He claimed is was like him to need to ask for help, try to persist on his own, put a lot of effort in to get it right, ask for assistance immediately, but spend extra time. It was unlike him to give up quickly or get frustrated. He reported in his pre-survey that overall he was confident in his use of digital literacy. However, he said in his blog that "My reaction to viewing DIL material is somewhat mixed and confusing" (Bernard, blog post).

Goals and activities

Initially Bernard was interested in learning about podcasting, as he wished to begin storytelling for radio broadcasting purposes. He said on his blog:

> I currently have some experience with some "bits" of digital technology and this project will allow me to hone my meagre knowledge base. This project seems to offer me further promise of understanding digital information and of where this may lead my plans for the future. (Bernard, blog post.)

Bernard attended three quarters of the workshops, keeping his desire to learn podcast production to the fore. He experimented with Audacity, (mostly he taught himself the software in a self directed way, but was able to draw on some expertise in the group as well), Firefox add ins, and Flickr. He checked out Morguefile, Podomatic, and Quicktime. He predominantly explored on his own, recording his findings methodically in his blog and sharing when he found something he thought would be of interest. He evaluated each of the tools he encountered with reference to his own proposed projects. He was quite focused in his objective of making podcasts, recording on his blog:

> I can produce a programme for podcasting by using free downloads off Internet and iMac will convert files to a more compatible configuration and allow podcasting compilation (Bernard, blog post).

But in addition, he also discovered and methodically worked his way through the online OIL modules, immersing himself in building his knowledge base by attempting each in sequence both at the workshop and in between sessions.

Learning and dispositions

He was thereby exposed to material on finding information effectively and efficiently and by attempting the activities in them, he learned a number of digital information literacy skills. He recorded their various topics and reflected on his learning on his blog and reported that he was appreciative of the digital literacy skills that he acquired as a result.

> I have developed my ability to search, locate and effectively use information and I can determine the extent of information needed. I can find information effectively and efficiently. I learned how to use the web and networking effectively. As an information literate person I can manage, collect or generate information. I learnt how blogs and wikis help to organise information effectively. (Bernard, blog post.)

Bernard also discovered the advantages of digital storage spaces however, which gave him advantages in his personal study. He was particularly appreciative of the online facilities he came across to store and manage digital material in a readily accessible spaces, rather than in the restrictive institute environment provided to him as a student. At the focus group particularly he expounded on the benefits of such services:

> I tell you what if students could have a blog then they would have a place to dump all their stuff and all their essays and all that cos there's heaps of space there. Now having had that space on your blogging it means you can put your draft copies on there all sorts of stuff …… because students only have 50 k or whatever it is to put on their (institute) accounts that doesn't give you an awful lot to play with really when you start getting into audios and visuals you got to ring up to IT to give you some more space or borrow their flash pens and stuff like this – we, students can't afford these flash gears and with having this extra space to put stuff on – yeah - well the students become winners. (Bernard, focus group interview.)

This, along with his discovery of Delicious.com bookmarking tags greatly advanced his skills in the management of digital information. But what excited him more, was that he could also pass his skills on to his fellow students, sharing his insights to assist them as well. He stated, "I will share this information to every student who wishes to understand how to access the information needed for tertiary study and otherwise" (Bernard, blog post).

Bernard appeared to be amazed by the possibilities that the range of tools he had explored gave to him and his fellow students. At the end of the project he said:

> Overall this project has advanced my understanding of digital information learning and the sooner one uses these tools the sooner they can be enriched with knowledge (Bernard, post-survey).

He was also intent on ensuring that his whanau and others were exposed to the possibilities and could share in the benefits as well.

> And yes, I will be asking my principle and elected representative about what changes should be made so all our children, parent, civilian, public can benefit from this digital technology (Bernard, blog post).

Bernard, however, was also able to share a creative skill he had acquired previous to the project with the participant group in the workshops - his ability to script and create digital video. Bernard found himself demonstrating what he had made and sharing his expertise with the others, staff as well as students, in the planning and preparation for, shooting and editing of digital video for educational purposes. His contribution to this aspect of the workshops was valued highly by his fellow

participants with many of them not realising the amount of effort that went into the making of an effective video, or the creative techniques that could be used, as demonstrated by Bernard. This was a notable example, with a reversal of role - the student sharing his digital expertise and teaching the lecturers in the group a useful skill. His sharing inspired a number in the group to attempt the process themselves and so add another aspect to their teaching repertoire.

Summary

Bernard acquired a number of digital literacy skills throughout the project, and felt he had gained power as a result. By the end of the project, Bernard moved from being an occasional user of the Internet, to a regular user, and his overall confidence level has risen to extremely confident. His post survey revealed that he is now extremely confident with websites, computer applications, and confident with discussion boards, online chat. He reported that he now confidently uses a blog on a daily basis.

His support needs have not really altered, but it is now not like him anymore to doubt his ability to solve problems that might arise. Although he now feels he will strike problems, he claims he won't ask for help immediately. His overall confidence with digital literacy aspects has risen to extremely confident. He was really pleased with the progress he had made, with the skills he had acquired, the connectivity he had developed.

> For me, being connected to the wider world is really exciting. OK I'm only up to Delicious and I'm only up to the first blog in my life but this is like the man that stepped on the moon – he said one step for the man he reckons, so I'm stepping off out to the sun then. (Bernard, focus group interview.)

Bernard is an example of a digitally literate person, having acquired the skills to access, evaluate, apply and particularly to manage digital information for his own purposes. He has displayed all the dispositions that a confident, reflective, technically knowledgeable user and creator of digital information should evince.

Liza: Case Six - MAPPING MY ACTION RESEARCH CYCLES

Topic: Use of digital technology in feedback and reflection in and on practice

Overall aims:
1. The enhancement of skills through visual feedback and interactive learning.
2. To explore the effectiveness of the digital camera in supporting students' reflection on their practice.

Reasoning:
The use of technology provides immediate visual feedback on implementation of new skills.

- Visual images enable the connection-making process between ideas/concepts and actions; between 'problems' and skills.

Personal aim:

To enhance my own digital knowledge, understanding and skills. For instance, maintaining a blog is a new venture for me.

I am encountering technological ideas, software and gadgets:

- Adobe Audition – 1 key point when making an audio file is to be clear of your purpose, and of your audience. Asking 'what am I trying to achieve?

Some ideas for using audio files:

- Developing audio files (wave file, MP3 file) of key points on a specific topic which can then be made available to students.
- The use of audio as part of reflective practice e.g. when focusing in particular on language use with children.
- I have learnt about and downloaded Skype and I have been thinking about future possibilities for 'video conferencing' as a way of providing on-going support to students, especially those that may be struggling.

Issue: How to make students' teaching practice more visible, thus enhancing student reflection in and on practice?

Decisions:

- Use of digital camera to record student's practice; after observation, during dyadic or triadic discussion, use either an Eee PC or a digital photo frame for feedback. This will make learning more relevant for the students as they can interpret their own observed practise i.e. seeing their practice through *their* lens rather than through mine as visiting lecturer.

Increased personal ICT use: Able to embed music in PowerPoint presentation to enhance teaching approach. Smart board knowledge and skills. **Increased ICT confidence**

Action: With support of a colleague I have obtained a digital photo frame and an EeePC to trial in my visual formative feedback on student teaching practice. I am still in the process of working out what the best systems are for the best outcomes and am looking forward to beginning the overall process.

Trialled the use of video as part of a student's teaching practice feedback process.

Outcomes:

- Good to see that video recording the student did not appear to impact on how either the student or the children engaged with the teaching and learning process thus providing authentic visual feedback on student practice.
- The centre saw it as an opportunity to gather feedback for themselves on what happened in the centre and how the children engaged in the programme.

Further decisions made:

- To develop and provide an Ethical Permission form for both the centre and the student to ensure ethical guidelines are followed at all times.
- The digital photo frame needs a power point, which limits where the feedback can take place.
- The sound quality of the recording was quite bad – this may have been the camera or the digital photo frame or both?
- Before the triadic or dyadic discussion, pre-view the recordings, and name them for easier access.

- To take continuous photos to see if this is effective in giving an overview of the student's practice, thus illuminating the need for sound.
- Use the EeePC with charged battery.
- Use digital recorder to record sound as well as record feedback discussion (suggestion by student in trial).

Personal next step:
Enrol in e-Learning course next year
Continue reflective process regarding the use of digital tools in reflective practice.

Action :

- Used video recording at the next visit as the situation was right for this – small group of children/ small centre/ limited noise
- Use of EeePC for feedback was very successful: 1) can be used anywhere as no need for electrical outlet; sound quality a lot better than digital photo frame; easier access to files and switching between files; 2) process of linking assessment criteria with sharing of visual images supported dyadic discussion; student was able to see practice and identify own areas of strengths and improvements.

Valerie: Case Seven

In this case, a series of action research cycles are shown to demonstrate the process she underwent. The full analysis of Valerie's case can be found in Appendix 17. Valerie's starting overall DIL score was 60% at the start of the research, and increased to 71% by the end. Valerie stated: "I have become more confident using Internet tools such as Flickr, YouTube, Slideshare. I can see useful applications for these" (post-survey). By the end of the project, Valerie no longer felt anxious about using tools, nor uncomfortable. However, she still expected to experience problems, and to possibly need to seek help from others. Her levels of frustration and annoyance at lack of progress also appeared to be lessening. As a result of the project, Valerie had increased her usage of new tools. The action research cycles she engaged in during the project follow next displayed as Figures below showing different approaches to the cycles.

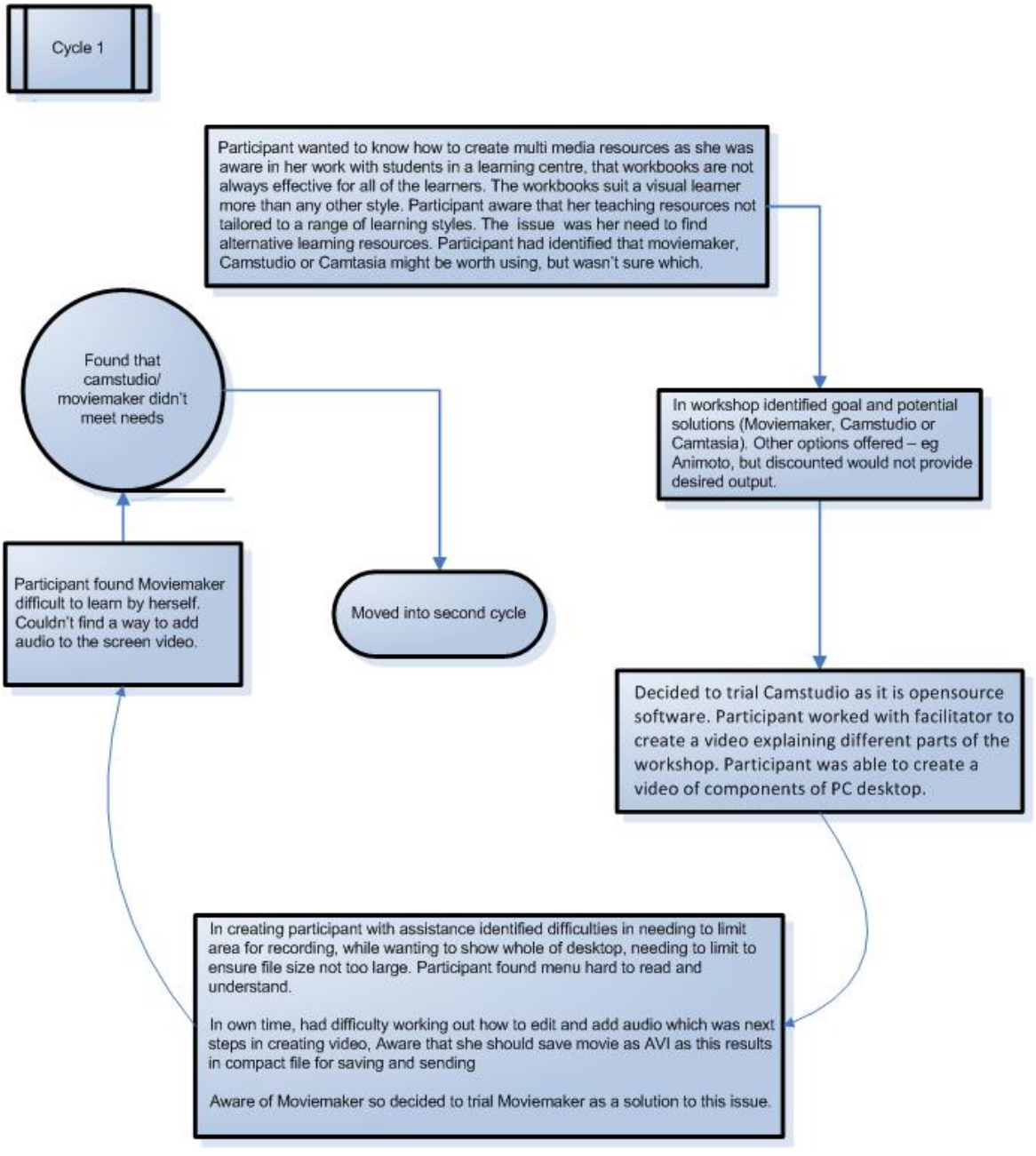


Figure 21: A second version of Valerie's Action Research Cycle 1

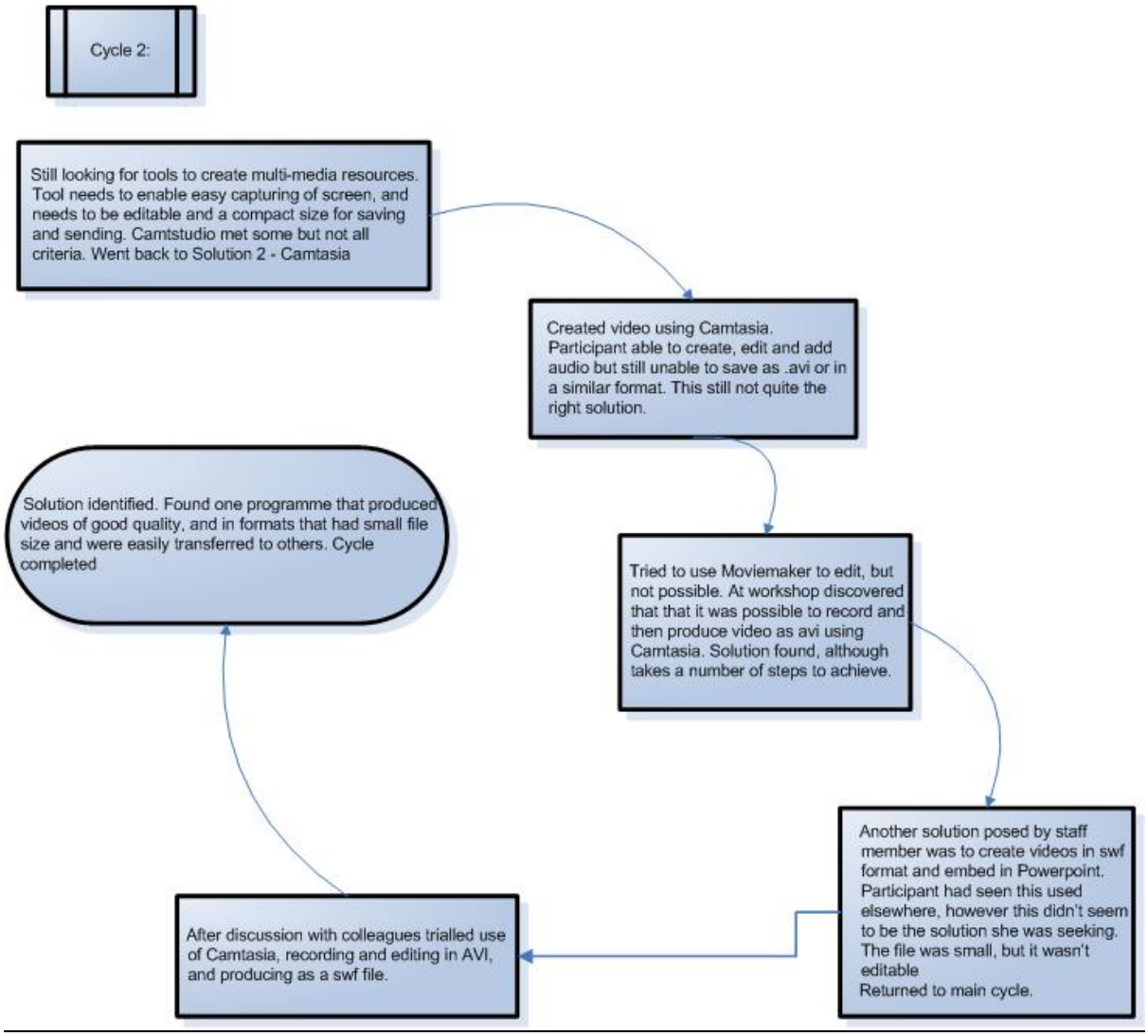


Figure 22: A second version of Valerie's Action Research Cycle 2

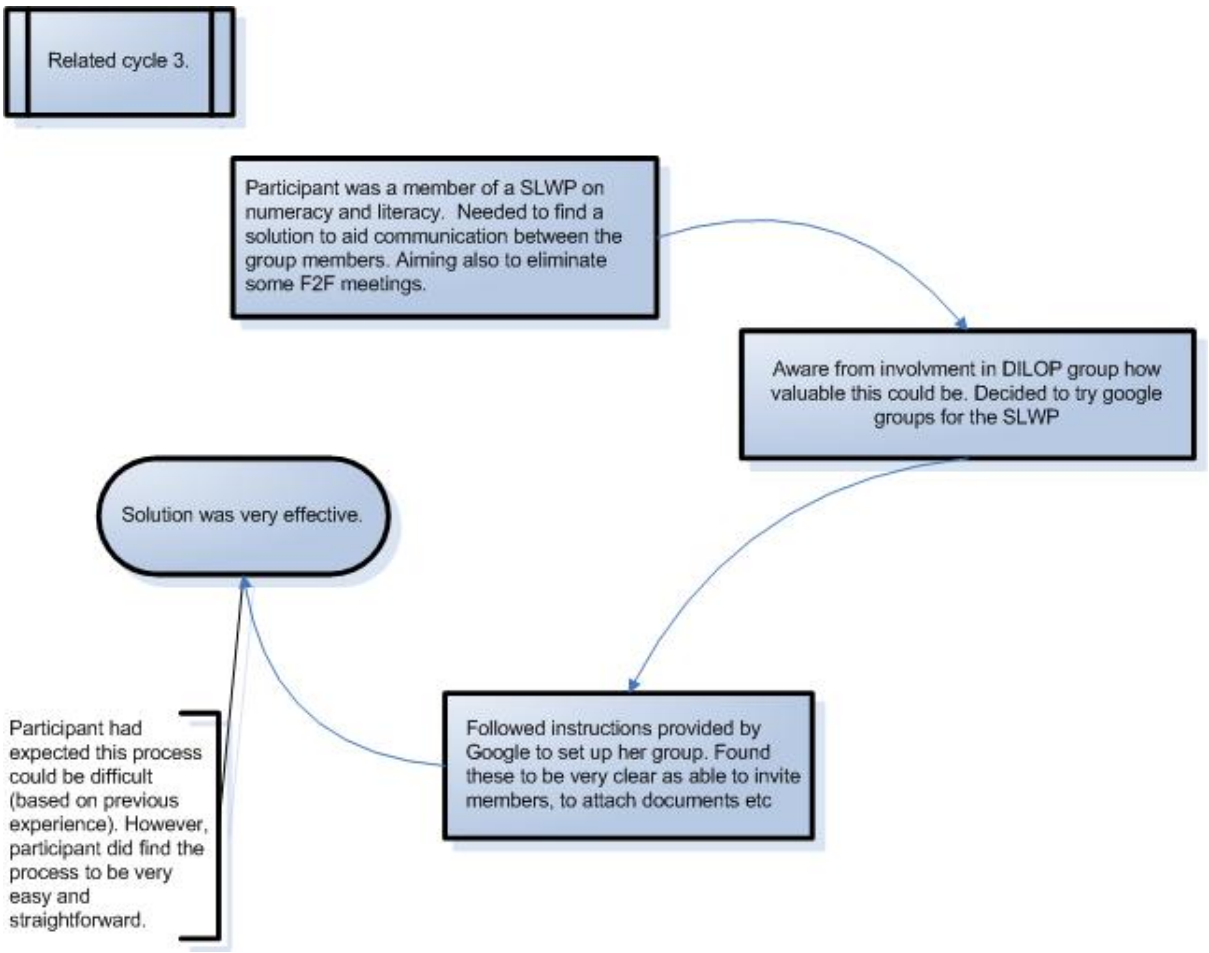


Figure 23: A Diagram of Valerie's Action Research Cycle 3

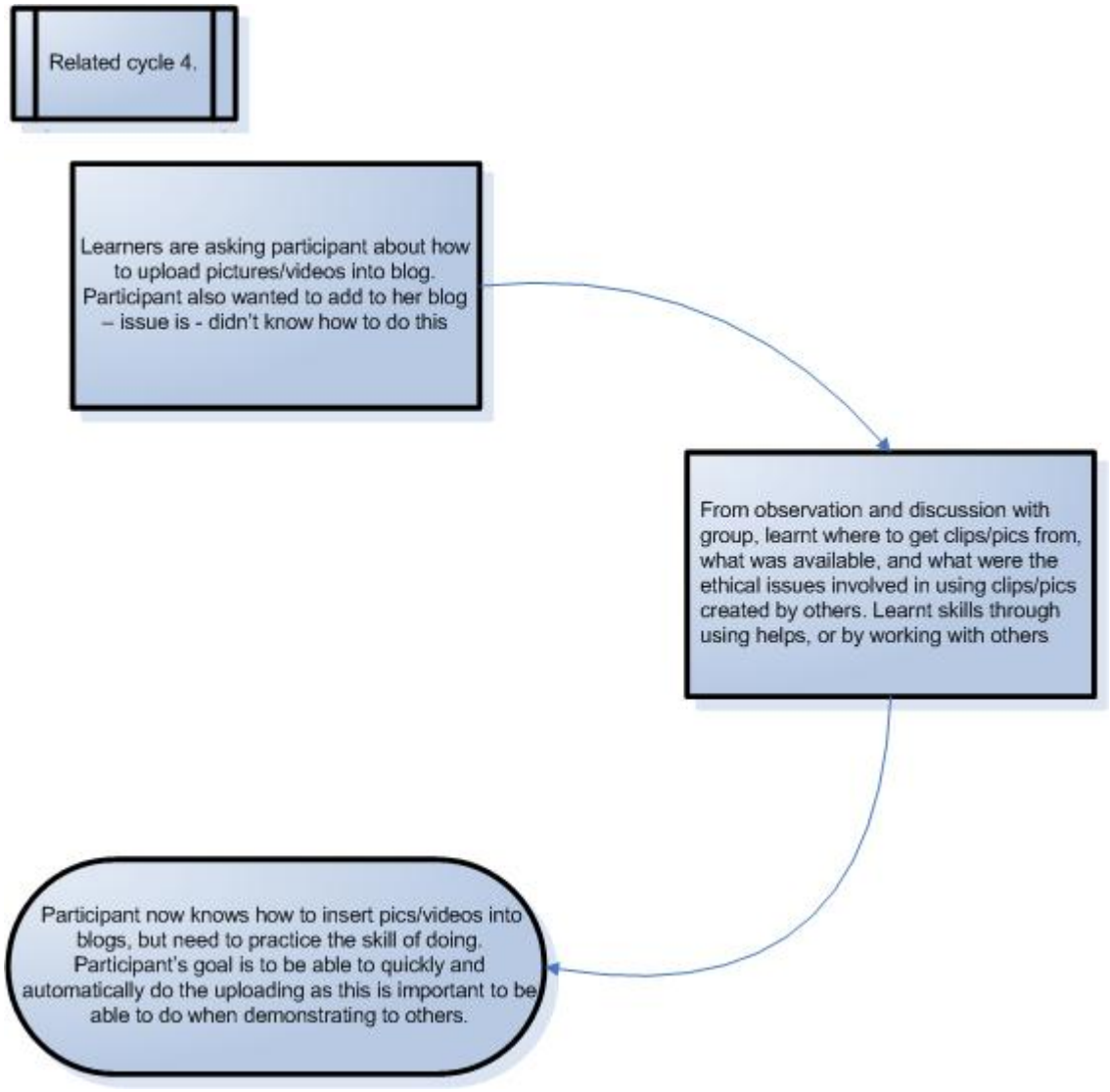


Figure 24: A diagram of Valerie's Action Research Cycle 4

Summary

The institutional case has captured the essence of the research and provided a snapshot across four institutions about the digital information literacy capabilities and approaches in use for developing skills for accessing and applying digital information. The individual cases illustrate the diversity of the participants, and the evolving process which was undertaken as they developed their knowledge and skills and made changes to the way they handled digital information issues and solutions.

Chapter 6: DISCUSSION

6 Introduction

There is an overwhelming volume of evidence for discussion for three of the four research questions. The fourth research question relies on a comparison of digital information literacy standards in New Zealand with other OECD countries, and is unable to be answered due to the lack of any international measures which fit this research. Discussion of the results is presented in five main sections starting with a discussion of the demographic findings, and followed by a discussion about findings for each of the research questions.

The findings with regard to the development of digital information literacy in New Zealand tertiary contexts are significant and will be explained in this chapter.

6.1 Demographics

Participants in the study were drawn from students, academic and general staff at each of the four participating institutions. NZ European women between the ages of 46 and 59 predominated, and overall women outnumbered men by a ratio of 2.8:1. The ratio of Maori to non-Maori participants was very low (< 1:10) and even lower for Pacific Island participants (<1:20). Several other ethnic groups were represented in the study the highest frequency of which was Chinese.

While the participants in the study span the range of representation the researchers were seeking, the age and ethnicity distribution of our study participants are clearly not representative of the New Zealand population as a whole nor are they necessarily representative of the distributions at each of the participating institutions. There are a number of possible reasons for this. Participation in the study was voluntary and relied upon volunteers seeing relevance and opportunity for themselves in taking part. Interestingly the researchers in the study also tended to fall within the most represented group, that is women in the 40 – 50 something age bracket. It is possible that the need for fostering digital information literacy is seen as particularly relevant by this group. A second but related reason was the need for participants to make a significant time investment in the study. Attendance at a number of sessions spanning many weeks was required as well as a willingness to engage in discussion and write-up reflections. It is reasonable to assume that unless a very tangible link to personal relevance, at the time when the call for volunteers was made, many potential participants would simply not sign up for the degree of involvement required.

At three of the institutions, however, there were waiting lists of staff due to the high interest in the project, and as numbers were restricted to 10 per institution not all interested persons could take part. Although where possible if individuals dropped out, participants were recruited from the waiting list. Forty-two participants began in the project and the by the end there were thirty-seven who completed. Those who did not complete did so for various reasons: health, travel, workload, unknown. There was an attrition rate of approximately 12%.

The low rate of participation from Maori and Pacific Island groups was disappointing but the reasons for this are unclear, although once again, the perception of relevance, and timeliness are potential factors.

The high staff to student ratio among participants (>1:2) was also notable, as was the ratio of staff participating who were also students (>1:5). Students tend to be very precise in linking their learning activities to course assessment (Gibbs, 2006). Without an explicit linkage to specific course objectives participation in a voluntary study such as this was probably never

destined to appeal to a large number and broad reach of the student population. By contrast, staff in tertiary institutions, by virtue of increasingly having to engage with a range of technologies in order to teach, are perhaps more likely to perceive participation in a study such as this as relevant and useful.

Interestingly, the participants reported themselves as regular users of the Internet and had three years or more experience in using computers, however, most individuals were not familiar or confident with tools other than the most common ones people tended to use for their work or study – word processing, spreadsheets, search engines, library databases, presentation software etc.. In several instances, participants who had previously believed themselves to be computer literate on entry to the project, when exposed to new digital tools and approaches, discovered that they had a lot more to learn. The expectation of a finite computer literacy, and the idea of working towards an endpoint when learning about information communication technologies for accessing and handling digital information is unrealistic and impossible, as the environment is in a constant state of flux (Phelps, 2002). It will be argued further on in the chapter, that it is the strategies for learning and handling change in technological environments, rather than a standardised literacy which are the key to success and the ongoing development of digital information literacy. Therefore, even if a standardised test for digital information literacy could be checked off, the minute a new software or technology appears on the horizon a person previously regarded as literate can easily become illiterate if they have not developed appropriate learning strategies and dispositions which will enable them to adapt to the change (Phelps, 2002). Whether or not this capacity to adapt is related to how educated a person is could not be determined in this research.

It was not possible to determine any correlation between digital information literacy and level of education. In general the majority of study participants were well educated with the large majority having some form of tertiary qualification. In addition among those studying, a range of qualifications were being sought from foundation level right through to PhD and in diverse discipline areas. This tends to support the idea that the factors influencing participation in the study have more to do with personal relevance and context than any specific gaps in education.

The pre-survey in which participants' perceptions of their digital information skills were explored lends further weight to the notion of personal relevance, especially in relation to the increasing use and sophistication of ICT in the tertiary environment. Across the four institutions the vast majority of participants rated their skill levels in digital or traditional information literacy as either the same, or higher for traditional skills. While 39% of those surveyed rated themselves as having a confident skill level with digital information literacy, more than 80% of participants identified the need to develop their skills further in order to cope with future and emerging academic contexts and in order to teach others.

A discussion of the findings for each research question follows next. Starting with a discussion of the importance of the elements associated with digital information literacy.

6.2 Strategies and tools - access and interpretation of digital information

Several themes have emerged in relation to the first research question and digital information literacy and they are addressed under the following topics: Factors which influence digital information literacy; supported exposure to tools; the face to face environment; supported play; support for different kinds of learning; fostering a range of communication techniques; becoming comfortable with a digital identity; understanding ethics and etiquette; the

importance of easy access; the role of the customisable Online Information Literacy (OIL) modules.

Factors which influence digital information literacy

Based on the DIL taxonomy (Table 2), there were six areas associated with digital information literacy: Recognition, access, evaluation, management, application and ethics and issues. Additionally capability as indicated by the dispositions (characteristics) an individual exhibits was regarded in this research as having seven facets: Confidence, problem-solving, motivation, interaction, reflection, technical aptitude and beliefs (Table 3). All these factors had an influence on the development of digital information literacy and detection of its presence in the participants taking part in the research.

Arguably the first aspect of being digitally literate is to be able to *recognise* that information is needed, that digital information strategies are required and that there are a variety of tools and technologies available to *access* information. Most of the participants in this project had recognised that they needed to enhance their skills in this area: 83% reported that they needed to develop their skills to accommodate more sophisticated academic contexts into which they were moving, and 80% said they needed better digital information skills to support or teach other people. Joining the project was a tangible step in achieving this improvement.

With regard to *accessing* information, (that is, knowing where the required information is located and how it can be obtained by digital means) half of the participants at the start of the project felt that even though their skill levels were the same for both traditional and digital methods, they estimated their digital skill level as average. By the end of the project, 70% of the participants felt their digital skills were high or very high with regard to accessing and using digital information. Discussion of this research question goes some way to exploring how that shift occurred.

The *evaluation* of information the participants found and how effective they found the digital tools and strategies they used for their selected purposes are also pertinent to this question. Several participants took a systematic approach to gaining information and evaluating it against their own criteria for usefulness to achieve a goal, be it to put photographs on the web, make teaching resources or evaluating the features of various types of software for their purposes.

Participants also valued the time they were able to spend in *application* of the digital tools or strategies they encountered as they synthesised the information for a purpose or created new understandings. Discussion of the factors associated with digital information literacy has been grouped into sections. A strong theme which has emerged from the research is the need for support as participants are exposed to new technologies. Not only do they need support to discover which approaches have relevance for them, they also need an appropriate environment in which to learn, guidance from those at a more advanced level and moral support and assistance from peers.

Supported exposure to a range of digital tools

Participants during the project explored and used a broad range of tools and strategies associated with digital information. The workshops served as an ideal place to introduce a wide array of tools for accessing and applying digital information, often at the request of the participants themselves and as the sessions progressed, showcased by the participants themselves. Starting points varied in terms of both confidence and the range of digital tools with which participants were familiar, however, the pre and post-survey responses revealed a general shift towards a greater range of tools being used by individuals, with a greater degree

of confidence. This was also evident from researchers' observations, and has influenced individuals' final DIL scores.

As expected, from the responses and level of engagement of participants during the project, the greatest movement occurred in the use of tools which participants had either previously not used or used to any extent, e.g., blogs, web feeds, social bookmarking, file sharing, web conferencing and photo sharing, where shifts greater than 50% occurred. In terms of confidence, shifts of more than 40% occurred in blogs, web conferencing and social bookmarking. These findings are illustrated in the Results Chapter (Figure 16 and Figure 17).

The importance of support cannot be underestimated as this research has shown as progress was made by individuals as a result of them being given the chance to explore tools and their applications collaboratively in an environment where it was safe to make mistakes. Comments about making mistakes illustrated it was no longer an issue to do this. For example, "Exploring what a site or software program has to offer is no longer intimidating" (Mary, post-survey). However, comments such as: "I have had amazing support and encouragement, small group and one to one learning has been very beneficial to me" were also common (Colleen, post-survey).

This demonstrates the value of this group of individuals having support for their explorations, and the importance of having help on hand as it led to increased confidence for most of the participants in this research.

The face to face environment in Digital Information Literacy

The face to face environment still has a strong role to play in participants gaining confidence in accessing and using information in the virtual or digital environment. Only half of the face to face workshops in this project were compulsory, however, most of the participants in the study attended the majority of them, as well as the optional workshops in between. Therefore it indicates that the face to face learning environment played a large part in the acquisition of skills for digital literacy for participants. One participant commented: "The environment within the group has been really good. I have enjoyed sharing and listening to people's use of the technology we have been learning and exploring." (Melissa, blog post.)

Those who missed a workshop felt they had missed something important in their learning journey even though three of the four groups maintained a good deal of interaction in the virtual environment as well. As one participant reported on her blog:

> I missed session five, and quickly realised how helpful it's been to have some dedicated time to work on blog postings, investigate technologies and tools, and check on what others in the project are doing." (Tammy, blog post.)

It became clear that in the face to face workshops, participants were able to collaboratively enhance their skills in accessing and interpreting digital information. The participants were encouraged to set goals, and in practice their goals moved as a result of the group interactions which occurred when participants began to work together to achieve outcomes of interest to themselves and the rest of the group, something which is referred to as a form of emergent-collaboration (Nachmias, Mioduser, Oren & Ram, 2000). This appeared to come about as the participants were actively responsible for their own knowledge acquisition, (Kafai & Resnick, 1996), with the researchers in the role of facilitators of the individual and social learning process (Brown, 1992).

Additionally, the face to face workshop slot was a regular time which could be set aside to concentrate on the goals which they had set themselves, even when they shifted focus. This set time somehow added validity to the activity, even though it was regarded by some as a time to play. Phelps and Graham (2008) also claim that there is value in teachers being given specific release time when learning about technology because this adds an element of importance to the undertaking, and they are more likely to take the process more seriously.

Supported play

It is evident from the findings in this project that play allowed participants to see new possibilities, to gain new skills accessing and interpreting digital information and to experiment with applying their skills to real world contexts in which they were operating. Play permitted the making of mistakes in a low risk context where it was possible to indulge in trial and error, to repeat the action until it was mastered. Katie particularly saw the process as play: "Playing with fun toy ... playing with a purpose" (Katie, focus group interview).

The concept of playfulness is supported by Phelps and Graham (2008) who include this in their metacognitive model for learning about information communication technologies. They also report on the necessity for learners to become self-directed and to have the space to practise their skills for retaining learning. The project allowed participants to blur the work/play boundary in an environment where facilitators made every effort to maintain a balance between supporting and directing. Harris & Daley (2008), Göncü, & Perone (2005) and Meares (2005) found that play amongst adult learners fosters community building that requires dialogue, trust, sharing and reciprocity, all of which were evident in the workshops particularly. Also, given the digital context, the work of Siemens (2005) and Downes (2006) is relevant here regarding the importance of connectivity for stimulating learning.

Attendees in the workshops participated in learning that was based on conversation, interaction, sharing, and creating while they experimented with a range of tools for accessing and coming to terms with the digital environment. Through their *play* they formed networks of knowledge from their experiences and interactions with a knowing community (they regarded their group members as an important source of information). This is connectivist learning (Wikipedia, 2009).

Melamed (1987) identified the qualities of playful learning: relational (the capacity for cooperation and connectedness), experiential (validating and learning from experience), metaphoric (intuitive and right brain thinking) integrative (valuing a holistic and organic connectedness to people and things) and empowering (facilitating transformation in ourselves and the world(s) we inhabit). Participants in this study displayed many of these qualities as observed by the facilitators as they interacted and collaborated and as they reported for themselves in their blogs or in the focus group interviews. The increase in reported self-efficacy with a range of tools was marked, as was the increase in confidence with digital technologies. Play appears to be an important aspect of building an understanding of the digital world, giving participants the courage to explore and experiment as long as support is on hand.

Support for different kinds of learning

Although participants were encouraged to consider their personal goals from day one of the project, as a result of the exploratory and interactive environment, their stated goals more often than not changed over the course of time. This was in some part due to the narrowness of their knowledge base on entering the project, (they did not know what they didn't know and so restricted their goals as a result) but also the widening of their horizons by exposure to the activities and knowledge of the rest of the group (Siemens, 2005). Consequently it became

important that the facilitators were able to support a range of approaches for the different participants despite where they began on the continuum of Digital Information Literacy.

Some participants preferred to work away on their own at times, some tapped into the expertise of another in the group, some tapped into outside networks, some collaborated together on exploration of a digital tool or service and all were encouraged to improve from their current position, irrespective of their approach. Bruner (1985) argued that cooperative learning methods (such as were displayed in the workshop interactions) improve problem-solving strategies, and Cranton (1999), drawing on the work of Habermas (1987), suggests that three types of group learning occurs in adult contexts– Cooperative, Collaborative and Transformative. Facilitators observed and fostered Cooperative learning in the groups at times, where the participants concentrated on mastering the subject matter – the technical terms, for example - and contributed to the learning of the group as a whole. At other times, Collaborative learning groups were observed and supported, where participants exchanged ideas, feelings (especially about digital skill levels and their progress) as well as information.

However, at some point all group members collectively engaged in reflection, examining their expectations, assumptions and perspectives either in their blogs which they shared, or in the workshops, or at the focus groups, and thus an element of transformative learning was taking place via the groups as well. Several authors have described how reflection and learning are interlinked, and the concept of transformation in learning, something which is more likely to occur when individuals engage in active processes, critical thinking and are in situations with an element of chaos (Zepke, Nugent & Leach, 2003; Phelps, 2002; Moon, 1999; Kolb, 1984). Therefore it was necessary for the role of the facilitator to be flexible and change as needed to correspond to the group's purposes and goals.

Elements of all three domains (Bloom & Krathwohl, 1956) - cognitive, affective and psychomotor – played a part in the development of digital information literacy. The cognitive domain was particularly prominent (obviously involving the use of terminology, following processes, accessing data, synthesising and applying it to a purpose), but so was the affective domain. The way in which participants developed their knowledge about digital information was within the dimensions formulated by Anderson and Krathwohl (2001): remember, understand, apply, analyse, evaluate, create, and these have an uncanny similarity with the aspects of the ANZIIL standards for information literacy.

Many participants entered the project with low self reliance, or self-efficacy with regard to digital information, and their attitude to learning to use technology was affected as a result. They initially blamed themselves for the vagaries of technological performance that they encountered, but as their confidence and persistence was fostered, their locus of control switched as they *got over themselves* and adopted a more problem- solving approach. The psychomotor domain played a part in the manipulation of the actual physical tools – such as Smartboards, laptops, digital cameras and the like. Practice to proficiency with tools that can be put to professional uses played a significant part in the learning of the groups, for all participants. Again time to play and achieve a reasonable skill level via experimentation was appreciated, as was the opportunity to communicate with the group.

Fostering a range of communication techniques

One of the valuable aspects of the face to face workshops for the participants was the chance to engage in technical conversations about materials and tools a they struggled to make their own understandings of the digital environment. Merely by sharing their experiences, participants were able to absorb technical vocabulary by osmosis, in an environment where it was okay to admit that they did not understand initially. "I get confused by versions and abbreviations and so didn't get any further" (Melissa, blog post).

The learning from this face to face communication was enhanced by the use of blogs, email groups and social networking sites during the project. It was hoped that some inter-institutional communication could also be established but this did not occur, however the level of trust within and the strength of the institutionally based learning community in itself was very apparent. Participants tended to use the form of communication which suited their starting level of digital literacy but often were encouraged to expand into less familiar, more public forms as well. The Internet provides many new places to communicate, new avenues for interaction to unfold, and they are often not modelled on comfortable twentieth century modes of communication. (NMC White paper, 2007). Participants were observed struggling with the new forms of communication trying to adopt the linguistic norms of conversation in these new electronic spaces, (Crystal, 2001), and with the associated publicness of them.

There is further discussion about this aspect of learning communities and social networking in relation to the second research question.

Becoming comfortable with a digital identity

It was observed that the participants differed markedly in their confidence levels in terms of both accessing and adding to digital information, particularly with regard to digital identity and privacy of information. It is well established that our decision-making processes are influenced not only by the actual level of risk that we face, but also by our perception of risk. Individuals often overestimate risks for things not exactly like their normal situation, particularly if they themselves are being talked about and remain under public scrutiny, (Rauhofer). Exposure on the Internet, particularly the construction of a digital identity, falls into that category. Participants in this study initially struggled with the openness of communications, with the sharing and collaborative web mounted aspects of this project. One participant commented about what she found on a family member's Facebook, for instance,

> All these photos are just sitting there and I thought he was sharing just with us and suddenly he's sharing them with the whole world I think Oh I have to get used to this whole new way of thinking…. the openness (Liza, focus group interview).

However, when supported while in the experimenting phase, participants became increasingly comfortable with sharing material in the open domain. Blogging especially was noted as a form of communication many had not tried before, and with the encouragement of the facilitators, participants became more confident and more willing to share their progress and thoughts. It would appear that familiarity gave confidence, as did a growing knowledge of the possible risks and expected consequences involved in the use of Web 2.0 tools. With this came a greater awareness of copyright possibilities and ethical issues, both when creating and utilising material.

Understanding ethics and etiquette

The ethical dimensions of accessing and using information, intellectual property and copyright were of interest to participants in this study. The participants were familiar with plagiarism in the non-digital world but debated copyright in the digital environment. Input from Librarians was valuable on this topic. Groups explored the implications of the Creative Commons concept at length also, with one participant (Mary) commenting in her reflection, "I have a better understanding of what Creative Commons is all about", and she applied it to her use of the Flickr photo-sharing site.

Ethical use was another topic which was explored with regard to accessing and using digital information and items. A participant realised a need to get permission to take and use photographs of students and proposed to develop and provide an Ethical Permission form for both the centre and the student to ensure ethical guidelines are followed at all times.

Etiquette was also discussed, with regard to communication in the digital domain. As mentioned above, recognising and adopting the linguistic norms of the chosen medium became important to the participants, realising there were rules to be followed, as illustrated by:

> I think that one of the most important things for me that I have realised is that there is an ethical component to being literate. Sort of a responsibility in the sense of going by the norms and traditions in particular sites that I go to have particular rules so if I join a particular group then I am bound by the rules of that group. (Stewart, focus group interview.)

The importance of easy access

It became apparent during the course of this project that the level of access to digital resources and information varied at each institution and therefore affected digital literacy skill level and the changes which could actually be achieved. At two institutions for example, access to digital video (e.g. YouTube) was not allowed generally, nor was the ability to load plugins such as RSS feeds and Delicious.com toolbars. Comments such as this were typical:

> During the week I've had a look at two social networking Web sites, Del.icio.us and Twitter . I couldn't get very far with them on campus - the firewall blocks adding the Del.icio.us buttons, and stops the streamed video on how Twitter works. Must have a look at home, (Tammy, blog post.)

Consequently when participants were exposed to these kinds of resources during the project, they had difficulty enhancing their personal digital learning environments at their place of work or study and often had to resort to participating only from the workshops (where access had been specially arranged) or from home. It was also apparent that institutional infrastructure (such as bandwidth) and the technical support mechanisms available (from an IT Helpdesk) impacted on the level of access and comfort that the participants experienced. This affected their ability to practise any new skills that they acquired during the project. Unfortunately, widening of access usually conflicts with security policies in institutions, so a compromise is needed. In addition, with the current cost of bandwidth in New Zealand, usage is generally regulated by institutions and opening access to more users in an institution often overtaxes the connection and speed drops.

If digital information literacy is to be fostered successfully, and the outcomes of the government's Digital Strategy (Ministry of Economic Development, 2008) – connectivity, capability, confidence and increased digital content - are to be achieved within tertiary institutions, then access has to be as easy and painless as possible.

In the next section, the way in which customisable online information literacy modules were accessed and utilised by participants is discussed.

The role of the customisable Online Information Literacy (OIL) modules

Over the past year, there have been a number visits registered from within New Zealand and around the globe, to the website where the online information literacy (OIL) modules are hosted (http://oil.otago.ac.nz). In 2008-2009 (from 2/10/2008 to 2/10/2009), 5,270 visits to the OIL site came from Dunedin with an average of 13 pages/visit. 4,059 came from Perth with an average of 17 pages per visit. The next top number of visits came from Auckland (2,971), with Christchurch, Suva, Wellington and Melbourne all registering less than 1000 but more than 400 visits. Around 30% of all visits were from individuals scattered around the globe.

The number of pages per visit can be used as a crude measure of the depth with which people engage with the site. On this basis, the most in-depth use by staff and students comes from the TAFE sector in Western Australia (17 pages/visit) and the University of the South Pacific in Suva (25 pages/visit). In terms of content, module 1 (Essay Writing), and module 3 (Writing a Business Report) top the most visited modules.

Having been shown them in the workshops both staff and students in the project made some use of the modules either individually or with their classes during their teaching. However, in the main, it was students who reported an increase in confidence and ability as a result of completing a number of modules. For example, Naia found them particularly useful, and said "so the Otago OIL units actually helped determine the key words. It helped me filter exactly what I want and be confident about what I'm using and whether it is actually legitimate." (Naia, focus group interview.)

Some access issues did arise in the use of the modules. These included embedded video content (which was not permitted by some institutional firewalls) and some of the interactive Flash animations were not accessible where the Flash plug-in was not pre-installed on institutional machines. Although various participants reported accessing the Online Information Literacy material, no customisation of them took place during the project.

The exploration of ready made modules specifically about the topic of information literacy was one of many approaches used by participants, but their primary interest was to work on issues associated with digital information which had personal relevance to them. Participants were not particularly interested in information topics, e.g., how to search for information, evaluate information etc., per se, they were more interested in the practicalities of accessing and using a broad range of actual digital information. The meaning of the pragmatic approach which participants took in developing their digital information literacy is discussed in the next section which relates to the second research question:

6.3 Personal online learning environments and the social networked community

Initially, the intention in the project was to assist participants to develop sufficient digital skills to be able to create individual electronic learning environments, as both a way to organize and keep track of what they were learning during the project, but also so they could explore Web 2.0 possibilities for tools and networking with others. As a starting point to social networking, the researchers had hoped that participants in each group would not only interact with each other but also with participants in the other groups. However, due to the constraints of both researcher and participant time and available funding it was not feasible to get participants to engage in anything longer than a 10 week stint of activities. There was insufficient time to get the participants to a point where they felt comfortable, or had the space to interact outside each group. Therefore, networking across the institutions did not occur to any extent, although one participant from Institution Four, who entered the project already

digitally capable, made the effort to comment on some of the blogs set up by participants at Institution Three. However, some of the participants did join professional online communities as a way to attain their goals for exploring the extensive arena of digital information.

Another challenge associated with this particular research question relates to the definition of personal online learning environments (PLEs) and what constitutes membership in a social networked community. The concept of a PLE will be discussed first, followed by the notion of social networking.

The concept of a PLE (Personal Learning Environment)

According to Lubensky (2006), and as previously outlined in the literature review, a personal learning environment or PLE is a method of accessing and organising digital material as part of an ongoing learning process. Also the use of the word online is assumed although it is not included in the term. There are several definitions and examples of PLEs and arguments for and against the concept of a PLE. Essentially the nature of a PLE generally attracts some form of social networking (Attwell, 2006).

Although there is no one definition of PLEs and social networking, it is generally accepted that they include digital components and that the connectivity surrounding them is reliant on a diverse mix of open and accessible tools. This is only possible if the Internet is used as the vehicle for communication and information exchange.

There is evidence to support the notion that social networking and personal learning environments can also include non-digital means of interacting and organising learning (Anderson, 2009; Martin, 2007; Sims, 2007). However, even when non-digital methods, such as a hard-copy journal, are used for organising information, most people predominantly utilize a wide variety of digital tools including – both open and web-based tools (Martin, 2007), and in some cases closed facilities such as organisational Intranets and Learning Management Systems are included (Sims, 2007).

Therefore, a PLE is considered to be predominantly an online concept, and a method which includes a range of tools and strategies for organising learning as opposed to a single entity or system (Attwell, 2006). Although some proponents such as Anderson (2006) regard the PLE as quite distinct from a LMS, others include the latter in the concept of a PLE as it is part of the learning milieu (Sims, 2007).

What is particularly interesting is the realisation that most of the participants in the research were not conscious that they were developing a PLE or that they even had one, and this is not an uncommon occurrence. As stated by Clark (2007): “Tens of millions of people have a PLE (Personalised Learning Environment). Hardly any of them see it that way – but that’s their strength: MyYahoo – 50 million, MyMSN – 12 million; Google personalised homepage – 10 million; Netvibes – 10 million etc.” (para 1).

In general, the term personal learning environment was mentioned in passing during the workshops, but participants were not required to create one as one of their learning goals. Instead they were encouraged and supported to seek solutions to address their individual digital information needs. Therefore, the concept was not defined for them in a concrete way which could be easily remembered. Consequently, for most participants, PLE was not a term with which they were familiar as evidenced by their responses in the focus group interviews. For some, a learning environment was equivalent to having a place and/or space on their computer where they kept a list of websites, or notes about what they had learned. For others it extended to the blog they kept or a hard-copy journal or the physical space where they studied. Most of the discussion about personal learning environments occurred during the

focus group interviews at the end of the project, and there was no particular definition agreed on by the groups of participants and researchers, rather an understanding that the PLE would include digital aspects.

If the definition of a PLE used in the project does include any entity which includes non-digital methods, and any physical means associated with learning, the benchmark against which to ascertain if participants did make gains in digital information literacy through the use of a PLE and social networking is too broad. Notably, all participants through their association with an educational organisation, and their existing experiences as learners, whether a student or member of staff, already had some type of learning system set up for themselves, albeit it formal or informal. What the project actually did was act an enabler for participants to expand existing PLEs, and to engage in social networking mainly within specific institutional groups, but in some cases they accessed communities outside the group as well. The differences between what constitutes a group, a community or a network will not be addressed in this project.

However, for the purposes of this research, and the type of data collected to answer the research questions, it is necessary to regard the PLEs produced as an end product in the project as entities – which contained both digital and non-digital tools, and included approaches which participants had previously not utilised in their learning. It also necessary to recognise the importance of learning as a continual and lifelong process whereby a range of tools are accessed and utilised to support it, and organised by the learner when they need them in both formal and informal contexts (Attwell, 2006). Hence the PLE is dynamic as opposed to static regardless of the technologies used in it.

For some participants evidence of a PLE included additions they had made to existing PLEs, some of which were already digital and web-based, while for others the evidence relied on whether they had to enter previously uncharted territory in their exploration of a variety of Web 2.0 tools and other resources, e.g., Online Information Literacy (OIL) modules. Some participants, for example, added online tools such as blogs, as well as electronic and local technologies such as SmartBoards to their repertoire, whereas others entered the sphere of professional online communities, e.g., LinkedIn etc., having previously participated only in social communities such as Facebook or Youtube.

It is difficult to extricate PLEs and social networked communities, into separate sections of the discussion, as the two are often intertwined. This is because many of the tools used in a digital and web-based PLE are social and networked as a matter of course (Attwell, 2006). Certainly both are reliant on some sort of connectivity or interaction and a PLE usually does include tools for networking as illustrated in Figure 25 (Wilson, 2006).

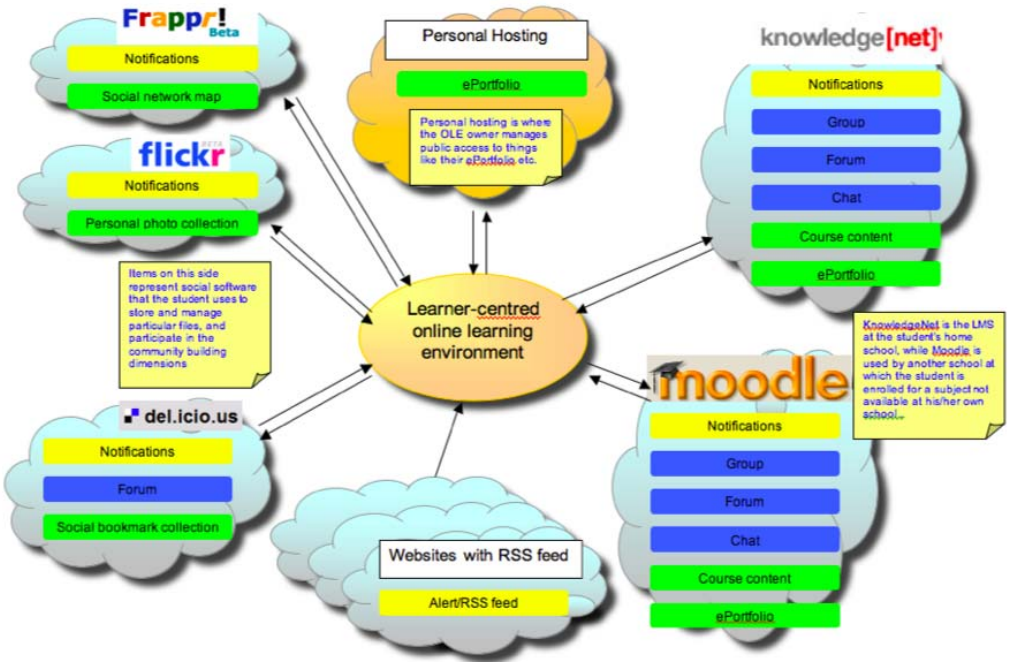


Figure 25: A learner-centred online learning environment by Scott Wilson (2006).

This PLE in the diagram illustrates how open, network tools on the web as well as a LMS such as Moodle, can be used in combination. What was evident from the choices which participants made in the way of digital tools is that the tools were always relevant to their work, study or private lives. The same was apparent in the digital information goals they set for themselves, and the participants tended to select tools and software applications which were readily accessible and easy to learn and use. Another researcher has also found there is a connection between success in building capability for using social software, and support of the end user (Evans, 2007). In a safe environment users are more able to find solutions to real world problems using approaches which are relevant to meet their needs (Evans, 2007). The author also found that: “strategies such as modelling, just-in-time mentoring, work-based learning …, and immersion, i.e., using it in everyday work, [were] highly favoured’ (p.13).

It appears that evidence for the way in which personal online learning environments and membership in a social networked community influenced digital information literacy is linked to a multitude of factors such as:

- how participants set up or extended their PLEs and networks in the project;
- interactions within each group – face-to-face and online;
- the development of learning communities within each group;
- individualised goal-setting as part of a self-directed learning environment.

How participants set up or extended their PLEs and networks in the project

Firstly, several individual cases for a selection of participants from each of the groups have been described in Chapter Five, and these include the goals and activities undertaken as well as the tools participants utilized as part of the learning process. Cases for both inexperienced and unconfident users of digital tools and social network services and advanced users are

included. For example, Carol illustrates how a participant in the former category extended her digital repertoire of tools for learning (iGoogle for organising usernames and passwords) quite significantly, and made huge gains in her digital information literacy score as a result. Sandra in contrast rated herself as a confident digital user and her starting DIL score was relatively high (73%), however, she tended to use tools she was familiar with for the tasks she needed to undertake as a student. As a result of her participation in the project, Sandra developed the skills to bring information to the PLE which she set up using iGoogle and Bloglines, and she also integrated Google documents, Slideshare, Yahoo email and her blog. Other tools such as web-conferencing, wikis and Camtasia were accessed but not used to any extent during the project, though it is possible that Sandra stashed them away in her toolkit for the future.

The conundrum is whether all the tools to which a participant such as Sandra was exposed during the project can be regarded as belonging to her PLE. Is it correct to assume that a PLE should be comprised of the tools and approaches which are regularly utilised, and help formulate the learner's identity? Or is a PLE anything an individual makes use of in learning regardless of the frequency with which it is used? According to one perspective, a PLE , " encompasses the entire set of resources that a learner uses to answer questions, provide context, and illustrate processes, [and] …refers not to a specific service or application but rather to an idea of how individuals approach the task of learning" (Educause, 2009, p. 1). Therefore, if Sandra used any of the tools at all, even once, they became part of her PLE. However, a PLE must by necessity change and not remain fixed, because a PLE is dynamic and must evolve to fit the learner, and decisions are constantly required of users "to maintain, organize, and grow their learning environments." (Educause, 2009, p. 2.)

Additionally, if the project had extended over a longer period than 10 weeks, the extent to which Sandra's PLE developed could have been estimated. During the project, Sandra was engaging in a process of self-directed learning using the new digital tools which she had discovered. She admitted by the end of the project that she had more insight about herself as a learner. For example, she realised that it was her thinking which had previously created obstacles to learning about new technologies and not the tools themselves. This finding fits with the idea that "the process of self-directed learning requires a degree of self-awareness, and it must be given time to mature" (Educause, 2009, p. 2). According to Chatti's (2007) definition of a PLE the accumulation of tools and services is controlled by the learner and used as he or she judges as appropriate. As such a PLE incorporates individual personal spaces, which connect in a social context "with other personal spaces for effective knowledge sharing and collaborative knowledge creation" (p.. 1).

Also if Anderson's (2006) theory is true, that the PLE works because it can be innovative and sufficiently flexible to respond to the ever changing technological environment, Sandra's collection of tools in her PLE would be constantly evolving. Certainly, one of the other participants, Sarah, who demonstrated a diagram of her PLE (Figure 10) to the other participants in her group has since published another diagram of her PLE. One year on, she says she has fewer tools, on which she is now more reliant than others.

Another participant who labelled himself as a techno dinosaur on entry to the project, exited with a complex system for his PLE whereby he had two sets of everything – Google Reader, iGoogle and Google documents – so he could practice with one before going live with the other which he then utilised actively. For each participant, some sort of description of a PLE could be created, as every one ended the project with an approach to learning in the digital environment, and some also used non-digital means, which fits with the accepted definitions for a PLE. The constraints of time and the need for a bounded report prevent a description of all participants' PLEs. Suffice to say, participants used a multitude of tools to create their

PLEs, most of which they had not encountered or utilised to any extent previously, as that was the nature of the research experience, to get the participants to try out new digital tools.

There is evidence to confirm that participants' capability and skills in digital information either increased or was extended as a result of engaging in the project, and this included the expansion of their PLEs and interaction in a learning group or community which can be regarded as social and both certainly contributed to their learning. Whether this was an actual social networked community in the true sense is debatable. Therefore, the formation of PLEs, particularly in a virtual context was found to be beneficial for the majority of participants.

This finding is supported by previous research where seven important factors were found to be associated with the use of PLEs, and they have strong similarities to was observed by researchers in this project: learners became more active and self-directed because they were involved in creating their own content; input and support from peers helped learners to personalise their knowledge; learning material was infinite and there was more choice; opportunities for social learning; more ownership of resources; learning became was more self-directed and organised; exposure to a range of technologies and social software tools enabled "aggregation of multiple sources" (Schaffert & Hilzensauer, 2008, p. 4).

However, what the research findings cannot confirm is the extent to which PLEs or social networking influenced participants' digital information literacy as a direct measure of the DIL scores.

Interactions within each group – face-to-face and online

Secondly, the researchers are convinced about the significance of the interactions which participants in each group experienced as a result of taking part in the action research. In accordance with the definition of a social network used to describe social systems:

> A social network is a social structure made of individuals (or organizations) called "nodes," which are tied (connected) by one or more specific types of interdependency (Wikipedia, 2009).

Each research group could be regarded as a node and there was an aspect of interdependency between participants. Once the concept of a virtual or online community is brought into the mix along with social software and computers and the Internet, the group takes on aspects of what is regarded as an Internet-based social network (Wikipedia, 2009). There is a whole research discipline related to social network analysis, therefore, it was not appropriate to explore this aspect in the project.

The design of the project encouraged conversations and connections to occur in both face-to-face workshops, and also via online tools such as blogs, professional networks, social networking sites, e.g. Facebook, and email forums set up for use within two of the groups. It is beyond the scope of this project to analyse in any depth the interactions which occurred in the groups, suffice to say that the actions of the groups did fit definitions of a social network – traditional and Internet-based. For example, Garton, Haythornthwaite & Wellman (2006) describe a social network as; "…a set of people (or organisations or other social entities) connected by a set of social relations such as friendship, co-working or information exchange" (p.75). However, these authors only regarded the social network as connected via computers and were interested in the relationships and interactions which arose from them. Even though the interactions which occurred between participants within each group were not strictly equivalent to what is regarded as social networking in a virtual community where every communication occurs online (Wikipedia, 2009; Downes, 2004), many participants did access

social software. It is well known that social software, a term coined by Attwell (2006), facilitates network interactions via computers, for several reasons:

> …it lets people rendezvous, connect or collaborate by use of a computer network. It supports networks of people, content and services that are more adaptable and responsive to changing - needs and goals. …it underpins what is loosely referred to as Web 2.0 …[enabling] a two way process, allowing the Internet to be used for creating and sharing information and knowledge, rather than merely accessing external artefacts (p. 4).

Therefore, those who made use of social software were entering social networked communities on the web, something which added another dimension and richness to the local communities when they shared their experiences. Stephen Downes (2004) defines as a social network as:

> …a website whereby individuals describe themselves in a personal profile, reveal themselves through participation in communities, and form networks of interactions by declaring one another to be 'friends' (p.3).

He also differentiates between a social network and a blogging network as he claims the former requires a social network service such as Friendster to function.

However, not all participants utilised the social networked communities to their full extent, e.g., subscribed to others' resources or made lists of contacts or friends, as they started with the functional aspects first. Even so, one of the outcomes of interacting in social networked communities, irrespective of the type or location, contributed to participants' knowledge. The majority of participants certainly engaged in an exchange of information and knowledge with others. Some did this mainly in their immediate groups as they worked to access and learn about a range of digital tools, and some did this via computers as well as face-to-face. There was also the rare situation where participants isolated themselves from the group in favour of communicating with external parties, but they still attended the workshops and made their blogs or other site available to their group. Thus everyone networked to some extent within their immediate groups.

Additionally, it can be verified that the interactions which participants were observed in, equate to knowledge sharing (KS), an outcome of social networking and something which is regarded as a critical element in building organisational capacity (Lamoureux, 2006). This concept of KS was successfully implemented through techniques such as: peer assist, where a group of peers worked on real-problems to find solutions; facilitated workshops both face-to-face and online; "after-action reviews" and "storytelling" (p.104). All these processes were in practice in this research through the reflective journaling or blogging which participants were asked to do, and the conversations which occurred in the workshops, on the blogs and in the email forums where they were used. Consequently, participation in the research project had an influence on building a community of learners who engaged in peer discussion and supported each others' learning.

The development of learning communities within each group

Thirdly, in the researchers' experience from this project, although strength of community was evident, to varying degrees, it only occurred within the groups that developed at each of the institutions, and was not predominantly online for the majority of participants. The development of a learning community or community of practice did eventuate across the institutions but this was between the researchers as opposed to the participants who took part in the project. The constraints of the project prevent this aspect being explored further.

It was evident that over the course of the 10 week action research period, the development of learning communities within each group occurred as a result of several factors: the relatively unstructured, yet supportive nature of the workshops, the facilitation provided by the researchers and the support of peers; all of which stimulated engagement in digital environments for all participants regardless of their starting skill level.

If the definition of social networking is extended to include face-to-face interaction, and this has been put forward recently by Anderson (2009), the research participants did form a social networked community at each institution. Each group also developed as individual "dynamic learning communities" because they demonstrated all the characteristics associated with such an entity (Wilson & Ryder, 1996, p. 2). The measure of a dynamic learning community, includes one which is autonomous and responds to: decentralised control, has committed participants who are willing to create and share knowledge, and engage in flexible and negotiated learning activities. Plus the individuals interact through dialogue and collaboration on a "shared goal, problem, or project that brings a common focus and incentive to work together" (p. 2).

All these aspects were present in each of the four groups. The most positive outcome for the participants was the opportunity, which each community afforded them, to take charge of their learning, and develop the skills to both evaluate their learning needs and action them (Wilson & Ryder, 1996). The majority of participants also demonstrated a disposition and willingness to share the information and learning which they were undertaking; that is, they were willing to share knowledge.

For some participants, the unstructured approach to learning was a new experience, and although many participants were challenged by the messy and complex nature of the learning milieu they found themselves in, the majority worked through the problems they set themselves until they found appropriate solutions. The support of the group and their peers was essential in this process. According to Phelps (2002) the development of capability in computer users is not a linear process as learners must traverse a multi-faceted and complex path of exploration, punctuated by external influences or stimuli. These stimuli create "bifurcation points", and these can "either decrease confidence or increase confidence and skills" (p.184). Phelps (2002) also claims that capability development requires a two-way stimulus rather than "direct instruction" in the form of interactions with others who can help, or resources which can assist or self-directed strategies (p.186). Otherwise learners remain on a linear path towards competence which may mean they obtain the skills and knowledge they need in the short term, but this does not prepare them for life long learning, and enable them to deal adequately with the flux of change which technology brings (Phelps, 2002). In the section which follows, there is more about the type of strategies which were shown to assist in the development of digital information literacy.

Certainly the development of a dynamic learning community was key to the development of participants' capability. Additionally, even though most participants found the process challenging, the majority also found the experience worthwhile and motivating, and they all left the project equipped with new digital skills and knowledge as well as strategies for learning about technology, albeit at varying levels of advancement. The majority of participants had also discovered a new network of contacts on whom some felt they could call for assistance outside the project.

Individualised goal-setting as part of a self-directed learning environment

The design of the action research was definitely enabling for participants in developing their capability and skills in digital information. Not only were they able to benefit from the group interactions and support from the facilitators, they were also encouraged to reflect on their

learning, and to set goals. Through the act of dialogue with others in the workshops, participants began the process of reflection and self-review. They were also asked to record their learning in some way, and the majority did this in blogs with some using journals. There was the occasional exception to this. Also participation in the focus group interviews enabled a reflective process to occur at the end of the project as well. According to Moon (1999) there are certain outcomes which result from the reflective process. The learner becomes empowered as a result and is able to engage in developing the self and is better equipped to make decisions. She also claims that reflection and the deepening of learning are integral.

During the project, the act of setting goals and monitoring their own learning was supported by use of an action learning spiral (Coleman & Lumby, 1999). As previously mentioned (Figure 1), this entails cycles with steps for a plan, action, monitoring and evaluation. Processes of learning and discussing as well as reflecting and understanding led to replanning and rethinking. Most participants approached their learning about digital information using this process, however, it was not always easy to articulate the process and participants needed guidance. The action learning spiral provided some structure for the participants in an otherwise chaotic environment, and provided the glue to help them stay focussed as they played around in the limitless environs of digital information.

Although the aim of the researchers was to support participants to develop their digital information literacy, it is evident that there is no such thing as finite digital information literacy skills. This is a sentiment held by Phelps (2002) who is adamant there is no such thing as a finite computer literacy and this is because of the unpredictable nature of technology. However, she and others do believe it is possible to prepare people to develop and extend their literacy by providing them with metacognitive strategies for learning as these will help them to cope with change (Phelps & Graham; Phelps, 2007; Graham & Kerr, 2004; Phelps, 2002; Phelps & Ellis, 2002a). The type of goals which people set for themselves can have an impact on self-efficacy where computer learning is undertaken (Hu & Ryu, 2004).

Although some participants felt their digital information skills were just a little better, when exiting the project, they did acknowledge that they had made a huge jump in their ability to give things a go (a characteristic associated with participants who had a high starting level of DIL). Therefore rather than avoiding unfamiliar tools and approaches, they made an effort to try them. Where participants were already digitally capable, there were also changes. For example, Sarah said in the post-survey that she changed how she got answers to issues, and was more likely to seek them on web rather than ask peers as a first approach. Other participants such as Chrissie and Stewart also changed their approaches to information seeking and like some of the others they joined external discussion lists or used RSS feeds for the first time. There was certainly evidence of attitudinal changes in all participants, even in the case of digitally advanced users. All participants left the project more willing to take a chance and try new things. Plus many were overall more confident when faced with a challenge. This finding sits well with the evidence described by Phelps and Graham (2008) who found that the use of metacognitive strategies, e.g., reflection and goal-setting, as well as mentoring, peer support, regular meeting times, support with risk-taking and time for discussion resulted in “subtle changes in teachers' attitudes, values and day-to-day practice” (p.11).

The way in which participants approached their digital information learning varied. While some participants were happy to have learned how to keep a blog and use a few tools such as Smartboards and Powerpoint, others had set themselves up with a raft of open, online Web 2.0 tools – RSS feeds, e.g., Google reader, iGoogle, social bookmarking, Twitter, Flickr, Youtube, Blip.tv, Google documents etc., a set up which arguably could be called a PLE, and as such constituted membership in a social networked community which was wider than their

immediate institutional group. Over all the four groups, all participants ended up being exposed to and using more tools as a result of the project. And most participants achieved much more than they had originally anticipated they would. This is because they were highly motivated, something observed by researchers at each institution. So whether participants ended up with a PLE as such or just a collection of tools is the issue. There was only one participant in the project who actually described her PLE, and her understanding of a PLE fits with the accepted trend in the cyber community.

Conclusions

The workshop experience provided opportunities for participants to explore a wide range of tools and strategies with which most had previously been unfamiliar, and participants spent a lot of time in this exploration. All the while they were evaluating the tools and making decisions about what they wanted to use and include in their personal repertoire for learning. Although the period of 10 weeks was sufficient for the majority of participants to access and actively use a multitude of tools, they were not directed to set up a PLE as such, rather the researchers wanted to see what unfolded for participants. Also it was not until the project finished that most participants felt they had sufficient -skills and knowledge to make informed choices about what might constitute a personal learning environment. What participants went on to develop after the project ended was not followed up, though this would be an excellent area for further research.

It is also worth noting that there were some participants who did not feel comfortable keeping their material on the open web, and the process they chose for organising their learning resources included non-digital or closed aspects of PLEs, acceptable to some (Martin 2007; Shepherd 2007; Sims, 2007; van Harmelen, 2007). As would be expected, people who use online social services will be likely to have much more varied networks, and richer communication experiences, for example,

> Compared to those who do not use the Internet, most people who use the Internet an d use a social networking service, such as Facebook, MySpace, or LinkedIn, have so cial networks that are about 20% more diverse. (Hampton, Sessions, Her, Rainie, 2009, p.14.)

Additionally, participants left the project better equipped to deal with technological challenges and they were motivated to utilise a wider and more diverse range of tools and strategies for learning. They generally all enjoyed learning as part of a group, and found the dedicated time for playing was a boost as was the support of peers in a safe environment where no-one was judged, something other researchers have also recommended (Phelps & Graham, 2008). They also developed and extended their skills for interacting within a learning network.

Thirdly, participation in a process of action research, through the active pursuit of individualised goals for developing skills in digital information, was clearly influential in increasing digital information literacy scores for the majority. This process was used as a way of encouraging participants to take control of their learning and become more aware of themselves as learners. The action learning cycle was a strategy which encouraged metacognition, that is, it enabled participants to both monitor and reflect on their learning process.

Several researchers have investigated the relationship between knowledge, learning and metacognition where self-awareness, and the ability to self-regulate are primary outcomes (McCarthy& Garavan;Boyer, Maher & Kirkman, 2006; Klaczynski, 2006; Wilson, 1999; Boote, 1998; Flavell, 1999; Weinert & Kluwe, 1987; Klune, 1982). The action learning process certainly assisted participants in this.

In the next section, the importance of learning when developing digital information literacy is extended in the area of lifelong learning.

6.4 Digital information literacy for lifelong learning

As pointed out by Withnall (2000) the notion of lifelong learning has been around since Plato. However, its meaning has undergone a number of transformations since then. Work by Chapman, Gaff, Toomey and Aspin (2005) suggests that recent conceptualizations of lifelong learning include three aims: learning for a more highly skilled workforce for economic development; learning for greater personal development and fulfillment; and learning for a better and more inclusive democracy. The researchers found evidence that improving digital information literacy contributes to all three of these aims.

Productivity and Innovation: Up Skilling the Workforce

Much of the literature, including reports from bodies such as the OECD (1996), start from the assumption that improving digital information literacy will produce a more highly skilled workforce and improve productivity. There is little in the literature to provide an empirical basis for this assumption. Perhaps because this new literacy derives from *literacy* and later *information literacy*, it is regarded as self-evident. Nevertheless, our results demonstrate that even a relatively short and intensive period (with the right conditions) over which to develop digital information literacy can produce quite large changes to peoples' work behaviour and the skills they bring to bear on work tasks.

Higher levels of digital information literacy were associated with both qualitative and quantitative changes to people's work patterns. Qualitative changes were the most evident as people identified creative uses of new digital tools to enhance their work. Some people took this one step further and reflected on the implications and importance of changes in work practice for their professions. Quantitative changes were apparent when existing work problems were identified and practical digital solutions were found that improved efficiency and effectiveness in their everyday responsibilities.

More Creative Work

The work environment under study was an educational one. Consequently most of the changes in work practices related to teaching or the provision of student services. Most changes to workplace practice were qualitative as teachers and service providers considered innovative ways in which they could create stimulating, engaging and transformative learning experiences. These changes took three forms: enriching the learning environment using digital technology; finding alternative ways of engaging with their students and finally, promoting and developing digital information literacy in their students.

Diverse Learning Environments

Teachers have known for some time which teaching strategies can improve learning. However, many of these are difficult to implement in traditional classroom settings. Students are more likely to learn when: they are engaged in active learning (Mayhew, Wolniak et al.); can use multiple sensory modes for learning; and are exposed to a range of different learning experiences, receive timely and useful feedback (Ashcroft, 1987) and are set challenging, authentic learning tasks (Billett & Ovens, 2007). The advantage of digital tools, particularly Web 2.0 tools, is the relative ease with which teachers can create learning environments that satisfy these requirements. Given the opportunity, teachers in this study put more effort into enriching the learning environments of their students than into reducing their workloads. However, they were also able to find solutions to work problems that would make them more

efficient. Ultimately, improving student learning in this way will not increase the throughput of students with reliance on fewer resources, but it has the potential to produce better-educated students.

Interacting with Students

The digital environment is the natural habitat of the young. Young people have embraced interactive online participation and collaboration on an unprecedented way. Social tools developed for the Web 2.0 environment have played a large part in this change. Sites such as Facebook (www.facebook.com) and Bebo (www.bebo.com) provide spaces for meeting and making friends, sharing interests and shaping and promoting one's own identity. Blogs and microblogs provide a platform for sharing experiences and views with others, engaging in conversations with like-minded people, and book-marking sites such as Del.icio.us.com keep track of information that can be accessed from anywhere. Teachers in the study saw up-skilling in digital information literacy as an opportunity to engage with students at their level of technology in ways they believed their students would find more meaningful and relevant. Digital information literacy not only provides new mechanisms (digital tools) for interacting with students but also a common language.

Developing Students' Digital Information Literacy

While many teachers may stand in awe of their students' facility with technology, they also recognize that this ability does not necessarily constitute being digitally information literate. Many students are adept at using technology and discovering how it works. They are also often high users of search engines such as Google, largely because of their ease of use (Garoufallou, Balatsoukas et al.). According to Brown, Murphy and Nanny (2003) their overconfidence regarding their technological skills hinders their ability to see the need for information literacy beyond "googling". Students are far less able to effectively filter large quantities of information, critically evaluate information (Manuel 2002) or resist the persuasive power of the online media. As teachers and librarians improved their own digital information literacy, they felt empowered to meet their students on a more technologically level playing field, and therefore better equipped to work with their students on improving their (the students') information literacy skills, particularly their critical, evaluative and searching skills.

More Productive Work

Tying lifelong learning to the economic wellbeing of the larger community gained particular credence in the economic turbulence of the 1990's (Chapman, Gaff et al., 2005). It has since become central to education and economic policy as a strategy for developing a nation's stock of human capital, a necessary pre-requisite for economic growth. Additionally, it was thought to provide labour market flexibility (Tuijnman, 2002) as workers could become multi-skilled, enabling employers to deploy their workers to meet the changing demands of the market. Although less evident than the creative change in working behaviour observed in the project, it was apparent that improving digital information literacy led to an increase in efficiency for those who identified specific work issues and sought solutions. In a variety of ways people changed their work patterns from developing new skills such as effective search strategies, using new tools to organize work or materials, to developing more efficient problem-solving approaches.

While the researchers were able to demonstrate that digital information literacy has a positive effect on productivity and innovation, one warning note needs to be sounded. Time, or the lack of it, has the potential to be a major barrier to the benefits of digital information literacy materializing. The study provided two hours per week in which people were able to leave

behind work and study commitments and focus on developing their digital information literacy. They found this was not enough and spent many additional hours exploring or practicing on their own. Even so, the strong feeling of time pressure was ever present. Developing new skills and embedding them in work behaviour takes time. The danger of not providing adequate time is that the time spent on initial learning of digital information literacy will be wasted.

Changing the Way They Learn

Implicit in the notion of lifelong learning is the acquisition of learning strategies that will change and evolve to meet new learning demands. In this study, the experience of engaging with new digital technologies prompted a re-evaluation of learning approaches and caused a shift in approach as people realized that their old methods of learning were not appropriate. Additionally, the researchers found that supported engagement with the technology improved confidence and brought about an attitude change from technology-avoidance to being prepared to 'give it a go' when faced with new problems.

Changing Learning Behaviours

Three types of changes in approaches to learning became apparent in the study: collaborative learning as the accepted mode of learning; learning from play and the development of new learning strategies.

Collaborative Learning

Group learning is generally not favoured by Caucasians, according to other researchers, though it is more acceptable to other cultures and people born after about 1980 (Hunt, Eagle et al., 2004). They state that Caucasians feel that group work dissipates their own effort and encourages social loafing. As one of the participants commented, "As soon as a lecturer says get in to groups, I think god I wish I hadn't come today". However, faced with unfamiliar learning tasks and a relatively unstructured learning environment in which the teacher/researcher took a less central mentoring role, participants in the study progressively built small communities of learning that evolved into cohesive, support networks. These networks helped to create a safe, supportive learning environment in which people felt they could push boundaries and take risks. The success of the groups may in part be attributed to the willingness of the participants to undertake the various social functions, such as encouraging, described by Jacques (1991) as being essential to effective group functioning.

Initially, some participants felt uncomfortable with the backseat role of the teacher/researcher. One participant almost left the study because she felt she needed an expert to structure the learning. Left to their own devices, participants turned to each other for assistance and discovered that their fellow group members collectively were able and willing to supply help and support, an outcome predicted by the work of Horsburgh, Lamdin and Williamson (2001) who found students become much more positive about collaborative learning once they had experienced the benefits.

The diverse nature of the groups, which included ages from 20's to over 60; highly proficient technologists to novices and a mix of gender and ethnicity, brought a blend of experience, skills and perspective that provided rich resources for each of the groups. Learning became a shared experience. This included not only new information, but successes and disappointments. Particularly liberating was the realization that most people shared the same fears and frustrations. The case for improved learning from collaboration is well established in the literature (see for example, Gokhale, 1995; Jones, Scanlon et al., 2000) and for improved motivation (Moller, Huett et al., 2005). However, the researchers were surprised at the level of

emotional bonding within the groups. By the end of ten weeks, they had become very cohesive. As one participants said, “friends and mentors” (Vera, blog post). One person in the study made a negative comment about the collaborative format, but most people expressed a great satisfaction with the method.

Learning from Play

The most widely reported learning strategy used in the project was *play*. This strategy was described by the participants as exploring with an open mind to see what was there. There were no set goals, no structure, just following where curiosity led. Participants described this as being useful in a very new learning context where it is it is hard to set objectives “because you don’t know what you need to know, but as you get in to it, you start to get a clearer picture of what it is you need to know or should know” (Fiona, focus group interview). Another participant raised the issue of being in a state of “readiness” for whatever comes along. Some felt guilty playing in work time, and felt the need to give themselves permission to learn this way.

Little in the literature accounted for the spontaneous popularity of this strategy in adults. It did not go unremarked by the participants that playing around with technology was widely used by children and adolescents as a way of becoming proficient. Mastranglo (2009) defined play as having the following characteristics:

- Is pleasurable and enjoyable.
- Has no goals imposed from the outside.
- Is spontaneous, voluntary, and intrinsically motivating.
- Involves some active engagement on the part of the player.
- Requires attention to the means over the end production of the action or activity.
- Is flexible and changing.
- Must have a nonliteral orientation (p. 35)

These seem consistent with the nature of the play described by the participants. Mastranglo (2009) explained that play can be categorized as social or cognitive. Of the four stages of cognitive play, object play, also called practice, exploratory or manipulative play, seems to capture most closely the activity described as ‘play’ by the participants. The appearance of play as a learning strategy was initially surprising, however on reflection it seemed logical that for many of the participants, learning in a new digital environment placed them in a similar situation to children for whom the world is new. In this context perhaps adults instinctively revert back to the successful play strategy of their childhood.

Learning Strategies

After prior knowledge, the appropriate matching of learning strategies with the type of task is the major factor in successful learning (Hunt & Jeffrey, 2005). In their reflective journals many participants described how they adopted new strategies or approaches to learning about the digital environment and tools. The most frequently described of these was to “just do it!” and work through problems if they arose. One participant described how she had always avoided trial and error learning as too time wasting and frustrating, but came to value it in the context of developing these new skills. The group environment was important to the use of this

strategy as others were on hand as a safety net if things went wrong. A major advantage of the strategy was the increase in confidence experienced from successful mastery.

Some of the more digitally information literate and advanced participants urged others to use the Internet to find answers to their learning problems or queries. For those with low levels of digital information literacy this was initially a frustrating approach, however, it was progressively used more as participants gained confidence in their ability to navigate the digital environment.

Faced with a learning environment that was unfamiliar to them, participants had to evaluate how they had worked in the past and make adjustments to the new context. A range of other learning strategies were adopted to meet the particular learning needs of individuals. For example, one participant, a non-teacher, discovered that teaching others was an effective way to learn. Another reflected on her approach to learning and found a number of obstacles in her thinking that had to be removed to make progress. Yet another found she needed to structure her learning into small chunks.

Attitude Shifts

Most participants in the study felt that they had experienced a shift in attitude. Many started from a position of feeling negative about technology; some were so fearful they had physiological reactions when confronted with it, others were proud of their technophobia. In time they came to view it as essential to being literate in the 21st century and even a source of enjoyment. Underlying this shift in attitude was a growth in confidence, motivation and persistence. The literature on self-efficacy helps to explain this change. Broadly speaking self-efficacy may be described as the belief a person has about whether his or her ability can be successfully applied across to other situations (Albion 2000; Albion 1999; Matteson and Ivancevich, 1999; Decker, 1998). Those with high self-efficacy are confident in their ability and therefore more motivated to achieve and capable of greater persistence. Also linked to self-efficacy is Intrinsic motivation which is claimed to be" at the core of information literacy, the foundation for a desire to learn and find information independently" (Crow, 2007, p. 4). Internally motivated individuals are more likely to be creative, able to problem solve, and process conceptual information, whereas if they are forced to do tasks or even given incentives their motivation switches to an external locus of control and is less effective (Crow, 2007). The use of instructional technologies are claimed to be influential in assisting individuals to develop a more internal locus of control (Liu, Lavelle & Andris, 2002). A number of studies point to the malleability of self-efficacy and the ability to improve it with mastery experiences (Martocchio 1994; Maurer 2001), as well as in approaches which are used to develop capability where internal locus of control is a factor (Desautel, 2009; Graham & Phelps, 2008; Phelps 2002).

Many of the participants in this study started with low self-efficacy in relation to digital information literacy (pre-survey). Some described how they experienced severe physiological reactions when confronted with new technology. Their attitude to technological issues outside of their regular work-related tools was to avoid engaging with technologies. During the workshops they had the opportunity to explore new digital tools in an environment where there was no penalty and no embarrassment at making a mistake. Others in the group were open about their own fears so there was a sense of camaraderie about tackling the learning task. Failures and frustrations were shared, and often others in the group were able to make useful suggestions. Successes were also shared, enhancing the sense of achievement. By the end of the study the general level of self-efficacy had risen substantially (post-survey).

Future Proofing

Most participants recognised that the value of their new skills was in the way it prepared them for the future. A common metaphor used, described the project as the start of a lifelong journey. Others viewed their digital information literacy as a seed that needed to be nurtured. Many characterized their new literacy as personal growth that they expected to continue well into their retirement. Others felt that the experience had opened new worlds to them, describing how they were becoming more fluent in a language that enabled them to interact in different ways with new people, or even in different ways with people they already knew. The expectation of the ongoing growth of the digital information literacy was captured by one participant who commented "I think definitely it is something like learning to read. You don't go 'I know the alphabet, now I can quit'. There is so much more out there, and it is intriguing and interesting and you have got some basic tools and away you are going to go and keep going." (Sharon, focus group interview.)

Others perceived their future in terms of being involved or networked with like-minded individuals in communities of practice or interest. For some this was related to personal interests with like-minded people while others saw it as the opportunity to contribute to developing the digital information literacy of others.

There was much evidence to suggest that digital information literacy was very important for lifelong learning of participants in the study as part of being a productive and innovative member of society. Unfortunately, due to the small numbers of participants who identified as Maori and Pasifika, no definitive conclusions could be made for them or ethnic-related preferences for digital information literacy.

A discussion of the fourth and final research question follows next.

6.5 New Zealand academic workplace and other OECD countries

This research study could not determine the overall standard of digital information literacy in the New Zealand working age population. However, it has described findings from a small number of purposeful cases from across a range of NZ tertiary institutions. The variety of digital tools and environments and the highly contextualised way in which participants in this study engaged with these tools means there is little opportunity to generalise from our findings. This problem of ICT use being highly contextualised is addressed in the PIACC initiative.

> With regard to the ICT component, the emphasis of PIAAC is on the cognitive processes underlying literacy, such as dealing with dynamic and interactive problems as well as non-linear information structures, rather than on aspects of the use of specific information technologies. Indeed, an in-depth assessment of technology aspects would be difficult to undertake given the high context specificity in which technologies are utilised. (Schleicher, 2008, p.14)

Nonetheless, the findings from this research, used in conjunction with PIACC data when this becomes available, should provide a rich resource for planners and policy-makers who are looking to improve the ability of New Zealand adults to understand the potential of technology and make informed choices about when, and how best to use it.

7 Conclusions

7.1 Overview

The overarching message from this research is that capability, rather than a standardised literacy, is key to success in dynamic technological environments. This capability integrates strategies for learning, and takes into account particular dispositions for handling digital information and change in digital environments. The data gathered from staff and students in four different tertiary organisations, using a mixed methods approach, provided a broad and diverse body of evidence for the use of flexible and individualised methods to support the development of digital information literacy in the tertiary sector. The robustness of the research findings makes the outcomes generalisable because others can easily interpret them and apply the model in different contexts and situations.
The research findings confirmed that Digital Information Literacy (DIL) is an evolving concept. In this research, the definition of DIL did not assume an linear approach to seeking and finding information, as its precursors did but in contrast and most importantly, it incorporated both the skills needed for accessing and using digital information, and integrated them with the dispositions needed to be successful in this endeavour.

The survey instruments used for this research are a first attempt at measuring change in the level of digital information skill. Overall positive change resulted for almost all participants, with the greatest gains being from those whose initial self rating of DIL was around, or lower than the institution mean scores. As digital information literacy is a multi faceted concept dealing with an ever changing digital environment, measures indicative of progress needed to also consider the dispositions which predisposed users towards engagement with technologies, and this aspect may be more important than sample assessments, or self ratings of skills and knowledge. For example, there were shifts in attitude towards the use of digital technologies and strategies, with a growth in confidence, motivation and persistence - aspects of self-efficacy - and a resulting greater belief in their abilities to take on new challenges.

The use of reflective journals and blogs by participants to record the learning process had the dual purpose of encouraging reflective practice while exposing participants' thinking to the researchers. This data supplemented the information from the pre and post surveys. The case studies which were developed from the whole range of available data yielded rich material on individual particpants. When case study data was combined within institutions and across institutions, a number of key aspects emerged and these can be used to inform future programmes for developing DIL capability in tertiary staff and students.

This research has shown there is no one size fits all model; instead users of digital information are more likely to increase their their level of skill and capability if supported to work within an environment which they have created for themselves. In this research project, flexible programmes and strategies were used and they were successful in enabling learners to set their own goals based on personal relevance, arising from everyday life, work and study contexts. Modification of these goals occurred through online and face to face interactions including deliberate and supported exposure to a range of digital tools, often previously unknown to participants.

The face to face workshop environment was strongly appreciated for multiple reasons. In addition to offering on the spot feedback and ideas from fellow learners and facilitators, the two hour sessions were seen as providing permission to ‘play’ and explore. The commitment to a regular time slot was also favourably commented on by participants. The small groups of

about ten people at each of the four institutions enabled facilitators to encourage and support different kinds of learning and foster a range of communication modes.

The research indicates there is no one way to learn digital information skills, because individuals have different requirements and contexts for utilizing and manipulating digital information. It is essential in the changing digital environment that individuals construct their own toolbox of tools and strategies, and develop unique ways for independent learning and networking with others.

The differing personal learning environments (PLEs) developed by project members reflected their wide range of interests and needs. While the researchers debated whether PLEs must be digital for the development of digital information literacy, the PLE term was not something which most participants applied to what they were doing. Nevertheless, all participants found value in setting up a digital PLE of some kind. Among the researchers, there was agreement that the development of literacy with digital information meant some sort of organised digital system was necessary. For example, systems such as iGoogle were used to bring together access to RSS feeds and diverse digital linkages, creating some order in what one participant described as chaos. Others found a blog pivotal to their PLE as it enabled them to connect to a range of other web technologies.

During the construction of their PLEs, issues and ethics related to digital information emerged as matters of interest and concern for project participants. For example, issues such as setting up a digital identity on the World Wide Web and the ethical use of information, e.g., intellectual property and copyright. It was apparent that without support, privacy concerns may have created barriers and constrained the development of digital information skill and capability for a number of people. To participate in online networks was a new experience for some, and there were challenges. For example, the idea of having an online identity and having to remember usernames and passwords for a number of websites and web accounts. Initially, these aspects caused some frustration and tempered enthusiasm for other facets of the project, for some participants. Over time almost all participants became comfortable with having digital identities, and gained knowledge of suitable etiquette and learned more about intellectual property in online situations.

Another challenge for the research groups was the differing access which each of the four institutions could provide to Web 2.0 technologies. In some instances special arrangements could be made for workshops, but this was not entirely satisfactory if it did not reflect what was consistently available to staff and students. While these constraints did not apply at participant's homes, the lack of a broadband connection at home was potentially a barrier to their development of DIL.

One of the anticipated outcomes for the project was the dissemination and active use, including customisation, of existing online information resources such as the OIL (online information literacy) modules as well as Web 2.0 strategies for enhancing key digital information literacy competencies. Although it was envisaged that the role of the customisable OIL modules would be an important part of the project, the relatively small amount of use of these modules by DIL project participants, is understandable when the objectives of the two projects are compared. The OIL modules were intended to support students who had very specific needs such as writing their first academic essay, writing an annotated bibliography, searching a library catalogue, or dealing with day to day living and study in a tertiary environment. In comparison, engagement with digital information in this project was intended to awaken interest in a wide range of digital possibilities, to foster the use of interactive possibilities on and off line, and to support people in doing things that they may not have done unaided. OIL modules were meant to be easy to use, and after a quick look, participants knew the modules were there, when and if they needed them, but they did not offer the challenge

of gaining new digital mastery. High use of the OIL modules has also been noted when associated with a particular course requirement, whereas the development of a PLE in this project encouraged group members to choose strategies and tools to meet their individual, personal goals; some of which included the OIL modules.

Indications of increased and enhanced productivity were reported from participants who had a strong work or study focus for their goals. The researchers cannot be expected to substantiate claims about lifelong learning when reporting on a project conducted over a relatively short timespan. However, the major changes in attitude and confidence reported by participants who had previously struggled in a digital environment, and by those already confident strongly suggests that there was an impact which will affect their subsequent learning. Some of the changes incurred by participants are related to the learning strategies used by them during the research. Overall the diversity of the digital environment combined with the multiple and varied needs of learners meant that flexible systems were needed to cater for all participants. Facilitators became co-learners as they responded to individual interests and problems, face to face and online.

Comparison of pre and post surveys demonstrated positive changes in digital information literacy for the majority of participants, and this was largely due to supported exposure to new tools and situations, alongside changing attitudes and increased confidence. This finding was supported by the content of reflective blogs and journals, facilitator observations and post project interviews which added depth and detail to the data gathered. In a minority of cases, where participants had high DIL scores at the start of the project their DIL did not increase; however, there were positive changes in capability such as an increased ability to problem-solve or a more positive attitude towards using unfamiliar digital tools etc..

Most of the outcomes anticipated for the research project have been met. For example, a definition of digital information literacy has been developed and is regarded by the researchers as a starting point for further discussion with others' in the tertiary sector. Whether the definition is appropriate for Australasia is yet to be determined and once the findings of the research are disseminated further discussion can continue about this. The inclusion of digital information literacy standards in the ANZIIL framework is probably not necessary, but findings from this project may influence a change in this area. Several recommendations for achieving optimal digital information literacy skills (see below) and strategies for lifelong learning have resulted, as well as a model of social networking which facilitates a high level of digital information literacy relevant to tertiary environments.

The dissemination and active use, including customisation, of existing online information resources such as the OIL modules was not definitive in this project. However, evidence for using Web 2.0 strategies and technologies, e.g., blogs, social bookmarking, wikis etc., for creating personal learning environments (PLEs) and networking was found to enhance key digital information literacy competencies.

As previously mentioned it was not possible to fully determine the importance of digital information literacy for lifelong learning in New Zealand, though there were signs that some inroads were achieved in this area. Lastly, it was not possible to rate the digital information literacy of New Zealanders within the OECD due to a lack of measures for DIL in the OECD. Nonetheless, findings from this project can be used to provide a baseline for developing such measures for future research.

7.2 Limitations

- The number, ethnicity, gender and age of the participants recruited was not representative of the wider sector or the sub-sectors embodied in the project, i.e., Universities and institutes of technology/polytechnics. (The participants were predominantly in the mid to older age group and females and Europea.)
- The number of action research cycles had to be restricted to accommodate time and funding constraints.
- The numbers of Maori and Pacific Island staff and students were too low to obtain any conclusive evidence for these ethnic groups. However, the potential for digital networks for Maori groups was commented on by a participant and the value of kanohi ki te kanohi (face to face) interactions, such as those provided by the project workshops, is recognised.

7.3 Further areas of research recommended

- Comparison of selected items of survey data from this research with other research findings.
- Use of the research model with other groups with a broader age, gender and ethic mix to test the transferability of the findings in other contexts.
- Inclusion of larger numbers of Maori and Pacific Island staff and students in further projects.
- Test whether the DIL model is effective in readying graduates for the workplace.
- Use the findings from this project as a baseline for developing measures of DIL in future research.
- Investigate the most appropriate model of professional development for DIL development (fully online, face to face or blended) and the importance of time allocation for 'play' in digital information environments.

7.4 Recommendations

There are four main recommendations arising from this research. It is recommended that:

1. Learning programmes intended to develop digital information literacy in tertiary education settings must:

    - Have personal relevance for individuals and be integrated into everyday, work and study contexts;

    - Allow learners the opportunity to play and engage in supported exploration, as well as exposing them to new tools and strategies for organising a digital PLE or presence in a networked environment (Web 2.0);

    - Recognise the importance of allocating time for regular face-to-face, (or possibly where appropriate, synchronous online) small group, learning opportunities that provide support for diverse self-directed goals and flexible and collaborative approaches to learning;

- Facilitate participation in dynamic learning communities to encourage sharing and collaboration regarding digital information resources and knowledge;

- Encourage meta-cognitive awareness of the learning process, through reflective practice and peer communication;

- Provide support to allow learners to become comfortable with a digital identity and familiar with ethical behaviour in the digital networked environment; and

- Consider the dimensions of digital information literacy, and foster personal capabilities, conducive to success in an ever changing digital environment, as outlined in the definition of DIL developed for the project. (The actual dispositions and skills required are described fully in the project taxonomies, Chapter Three & Appendix 2).

2. Infrastructure at tertiary education institutions should be continually reviewed, in order to capitalise on the benefits of consistent access for staff and students to the latest web technologies, while recognising the ongoing need for security.

3. Educators and information services personnel should continue to engage in discussion and debate with the intention of reviewing and redeveloping a definition of DIL, based on the work done in this project, to underpin future programmes for developing and maintaining the digital information skills and capability of staff and students.

4. Further research is undertaken to clarify some of the key findings and gaps in this project – as outlined previously.

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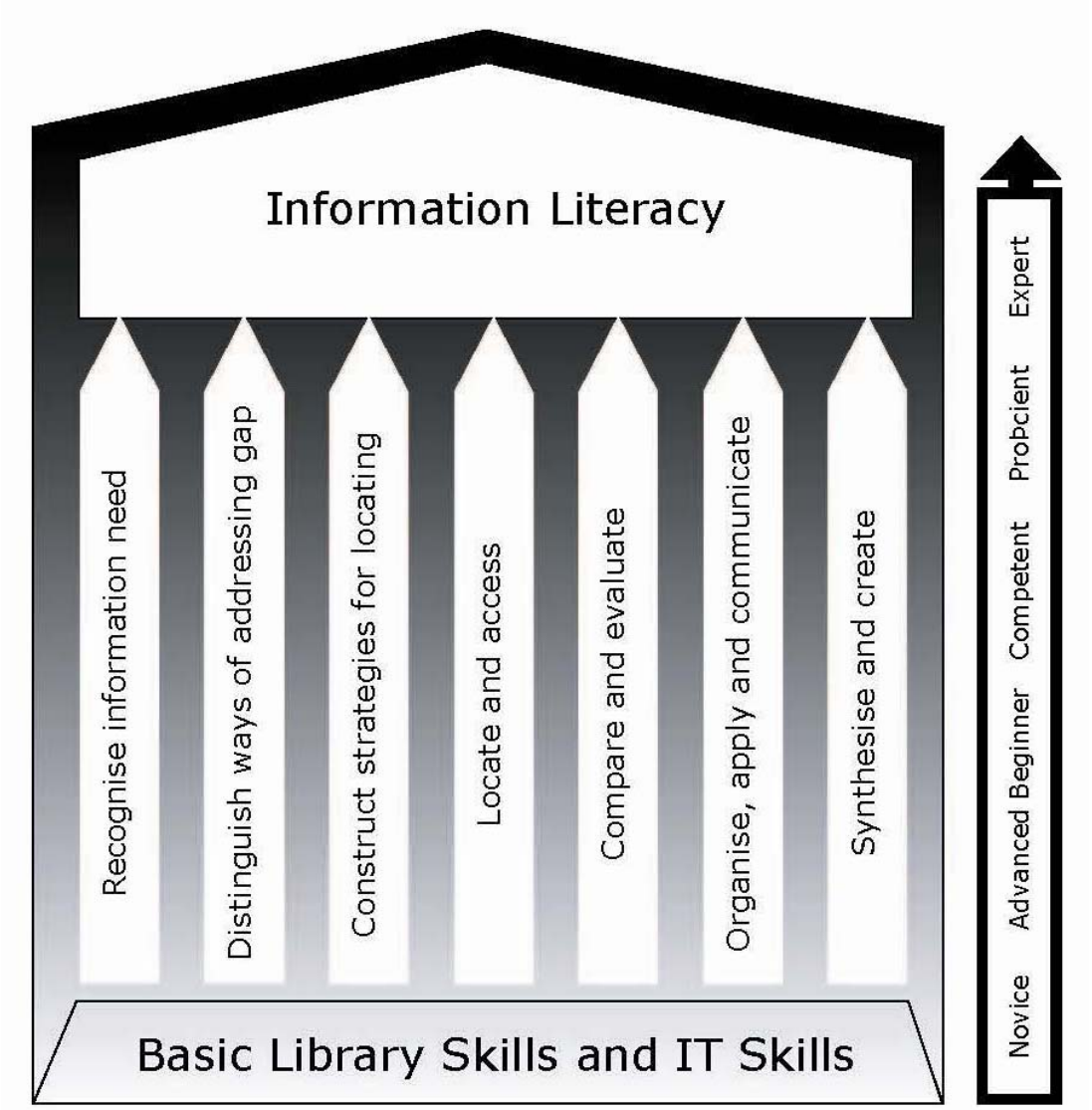
Appendices

Appendix 1 - SCONUL Seven Pillars Model for Information Literacy

(Source: http://www.sconul.ac.uk/groups/information_literacy/sp/sp/spportbw.pdf)



SCONUL Seven Pillars Model for Information Literacy

Appendix 2 - Taxonomies

Table 12: Digital Information Literacy (DIL) Taxonomy.

DIL categories	**These categories indicate the main aspects of digital information literacy demonstrated by participants.**
1. Recognition	Recognising the information needed, and/or the digital information strategies and/or digital information tools which are required or available.
2. Access	Knowing where the required information is located and how can it be obtained using digital means.
3. Evaluation	Evaluating the reliability of the information found, and how effective the digital tools and strategies are for a purpose.
4. Management	Organising information digitally and making it available for future access or use.
5. Application	Using digital tools or strategies, to exploit the way in which information is applied, communicated, or synthesised to create new understandings.
6. Ethics and Issues	Acknowledging or acting on ethical considerations and digital information issues.
The categories are based on ALA, ANZIIL standards, SCONUL, Digital Information Fluency and were modified during analysis of participants' data.	

In the Capability Taxonomy which follows next (Table 13) , the categories are based on dispositions for computer literacy and learning from research done by Phelps (2002). These have been considered along with DIF "overall competencies" and additions by the DIL project team. They integrate capabilities and attitudes relating to the DIL contexts and processes identified in the DIL Taxonomy.

Table 13: Capability Taxonomy – full version.

Capability Categories		**The categories are used to describe participant dispositions (characteristics) - observed behaviour or self reported participant actions and attitudes.**
2.1	**Confidence**	Confident in own skills and abilities (self-efficacy) for using information communication technology (ICT). A persistent and autonomous learner.
2.1.1	Persistence	Level of persistence shown or reported.
2.1.2	Self direction	Degree of dependence/independence shown or reported.
2.2	**Problem solving**	Is able to identify the nature of the problem, devise an approach and work towards a solution which contains digital elements. Demonstrates logic, inquiry, flexibility and creativity.
2.2.1	Logic	Can work systematically towards a solution.
2.2.2	Inquiry	Able to undertake and plan a digital inquiry.
2.2.3	Flexibility	Can transfer information and strategies from one context to another.
2.2.4	Creativity	Is able to generate original outcomes/products/strategies
2.3	**Motivation**	Has a positive attitude towards exploring and adopting new digital tools and strategies, extending and developing use of the known ones.
2.3.1	Risk taking	Has a willingness to take risks.
2.3.2	Engagement	Is able to engage in practices and to produce outcomes.
2.3.3	Curiosity	Is interested in digital aspects beyond the familiar, and is able to question.
2.4	**Interaction**	Able to share, collaborate or interact within the digital information environment when seeking information.
2.4.1	Sharing, collaboration	Contributes information and digital strategies to others.
2.4.2	Information seeking	Acknowledges the need for help by seeking information and digital strategies from others..
2.5	**Reflection**	Has the ability to examine the practices and thinking of self and others in the digital environment.
2.5.1	Evaluation	Is able to make informed choices and establish digital priorities.
2.6	**Technical aptitude**	Uses a wide range of digital tools and strategies and draws on appropriate terminology.
2.6.1	Terminology	Employs technical vocabulary to communicate.
2.7	**Beliefs**	Has particular beliefs relating to both the ability to operate in a digital environment and about the value of this milieu.

Appendix 3 – DIL Flyer - Recruitment

In a world of rapidly changing information technologies it is difficult to keep up with interesting and exciting opportunities that could make your learning and teaching easier and more stimulating.

Digital Information Literacy (DIL[5])

What is it? How can it help you?

The Digital Information Literacy (DIL) project offers opportunities for ***ten*** students and staff to participate in a small action research project. This project will help you identify and explore your digital information literacy needs for work or study and help you experiment with solutions. You choose what you want to do and the researchers facilitate a process to help you reach your goals. People from all areas of work and study are sought and places are limited.

Digital information literacy relates to how you access, interpret and create digital information. If your goal is to extend your digital skills and knowledge, we will find a way to support you using strategies and tools which are easily accessible.

Your commitment in working towards your goals will be to spend two hours a week (fortnightly facilitated workshop and self-directed) for a period of up to fourteen weeks. If your goals are achieved sooner, e.g, in four weeks (minimum time recommended), you move out of the project and someone else moves in. A small payment will be made in recognition of your contribution, and this will be aligned to your goals and what you achieve.

What could you do?

The following are some very broad examples.

- Streamline your digital information skills for academic writing – including accessing and using Internet resources and library databases.
- Develop skills for podcasting – audio, video, online tools etc.
- Use online tools creatively for digital information literacy - Learning Management System, e.g., Blackboard, Online Information Literacy (OIL) modules and Web 2.0.
- Customise an Online Information Literacy (OIL) module – http://oil.otago.ac.nz
- Learn about and use Social Networking software – blogs, wikis, social spaces, group email etc.
- Explore virtual worlds and gaming.
- Use online resources such as Google: Google Scholar, GoogleBooks, Sketchup, GoogleEarth, Statistics.
- Explore open resources such as Wikiversity, WikiBooks, WikiEducator.
- Create digital resources.
- Use an interactive whiteboard.
- Learn to use web conferencing for communication, projects and collaborative purposes.

[5] The DILproject is managed by Otago Polytechnic and includes Otago University, Massey University, and Manukau Institute of Technology

If you are interested in joining the project – Turn Over the page - or if you have any questions, please contact : Bronwyn Hegarty, project manager and research coordinator. Ph: 479 3600 or ext 8360. Email: bronwynh@tekotago.ac.nz

Merrolee Penman, lead researcher. Ph: 479 6043 or ext 8323 - Email: merrolee@tekotago.ac.nz

If you are interested in joining the project: Please provide the following information in designated areas below:

1. A brief statement about the issue in digital information literacy which you would like to explore and for which you need to find solutions – see the list of suggestions on the previous page.
2. An indication of the day and time **each fortnight** which suits for you to attend a workshop – see below.
3. Your contact details – add below:

1. Brief statement of the digital information issue or item you would like to explore:

_____

_____

_____

2. Please circle the day and time - indicate *first choice* AND *second choice*.

Monday	–	3- 5pm	4 – 6 pm
Tuesday	–	3- 5pm	4 – 6 pm
Wednesday	–	3- 5pm	4 – 6 pm
Thursday	–	3- 5pm	4 – 6 pm
Friday	–	3- 5pm	4 – 6 pm

3. Your contact details:

Name and area of work or study: _____

Are you staff or student? _____

Phone and email: _____

Please return this form (electronic or hard copy) to:

Bronwyn Hegarty, EDC, H100, Otago Polytechnic. Email: bronwynh@tekotago.ac.nz

An **information sheet** and **consent form** will be sent to you – this flyer does not commit you to the project.

Note: [Relevant contact details and person in other organizations will be inserted in place of Otago Polytechnic staff.

Appendix 4- Participant Information Form - Recruitment

Helpful Information

Project title

An investigation into the digital information literacy capability of tertiary students and staff and its impact on lifelong learning, productivity and workplace innovation in New Zealand.

General Introduction

A number of Ministry of Education funded research projects have identified a need for further research into how people develop skills in digital information literacy. Information literacy is an umbrella term that covers all the skills of locating, evaluating and being able to use information appropriately and for specific purposes. Digital information refers to electronic types of information – computer, CD, DVD, Internet etc., and how to use it well whether that is for everyday life, or in your role as a student or staff member of an institution. Despite computers being everywhere and used by many, research to date has been limited, especially on the newer computer based tools (known as Web 2.0). The Ministry of Education has funded a research project to explore digital information literacy. The project is being carried out by researchers at Otago Polytechnic, University of Otago, Manukau Institute of Technology and Massey University.

What is the aim of the project?

The aims for the project were determined by the Ministry of Education. Briefly they are as follows:

1. Investigate how staff and students access, and interpret digital information creating their own understandings using purpose built modules which are customisable and/or Web 2.0 strategies.
2. Ascertain how personal online learning environments and membership in a social networked community can influence digital information literacy.
3. Indicate how important digital information literacy is for lifelong learning of staff and students (including Māori and Pasifika).
4. Determine the standard of digital information literacy in the New Zealand working-age population compared with other OECD countries.

How will potential participants be identified and accessed?

You could be a potential participant and you may have either responded to a flyer, or you may have been approached by one of the research team, or you may have been approached by a colleague or another student and told about the project.

What type of participants are being sought?

We are looking for participants who are staff (any area) or students and who are keen to develop their skills in accessing, interpreting and creating digital information. Whether your skills are basic, medium or advanced we welcome you to the project. For example you may need to write an article or essay, and you may be a bit shaky when it comes to using an online library catalogue or database, or do not know whether an article in a newsletter is more appropriate to source than an article in a journal. You may need to be more effective in how you find and evaluate good sources of information, and reconstruct them for your own purpose. Or, you may know how to use a digital camera, but not how to present the digital images appropriately in an online portfolio. Almost any task in the workplace or tertiary institution requires skills in digital information literacy.

If you are a staff member, you may know that there are a number of ‘free’ tools and materials on the Internet that you can use to assist you in your research or in finding resources to use in class. Or, you may be concerned that students are using some of the tools, and you don’t know how to do that yourself. Or you may want students to develop their digital information literacy skills further but are not sure how to go about this.

We are looking for participants who are keen to develop and advance their digital information skills, and who wish to do so in a supportive group environment.

What will my participation involve?

Should you agree to take part in this project you will be asked to do the following:

- attend weekly workshop sessions for 1.5 hours at a time;
- participate over a period of up to 10 weeks (ie one semester);
- complete an online survey in the first workshop;
- participate in a focus group at the end of the workshop;
- fill out an exit online survey.

There will be up to 10 participants per group. The surveys will help the researchers (and yourself) estimate your beginning digital information literacy skills and confidence with computing, and the progress you make in these areas during the project.

Workshop processes

- In the first workshop you will be introduced to the notion of the *action research cycle* – where you will be asked to identify your digital information needs, and to consider potential solutions. You will have the opportunity to trial and evaluate the solutions (with the support of the researchers and others in the group).

- It may be that you have a specific need, and that a solution can be found quite quickly within 2 or 3 workshop sessions. You can then choose to leave the group, or you can also identify another area of digital information you would like to explore and to work through the action research process again. You can continue working through the action research process for up to 20 weeks of the project (10 weeks in Semester 1 and 10 weeks in Semester 2).

- As well as working through the action research cycle, you will be asked each week to spend part of the time discussing the progress you feel you are making with achieving your goal of increasing your skills. A researcher and/or research assistants will take notes during these discussions.

- During the workshop, the researchers will also observe what you are doing, as well as other happenings in the workshop. These observations will be discussed with you and notes made by a researcher to add to our understandings of the process you use to develop your skills.

- As some of the tools you may choose to trial can be publicly viewed by others, researchers may also use that information as a source of data.

- Finally, on completion of the workshops, you will be asked to join a focus group to provide feedback on the process. You will also be asked to complete an exit survey. The results between two surveys will be compared to estimate your progress with advancing your digital information literacy skills.

- If you leave the workshops before the end of the first or second set of 10 weeks, you will be invited to complete a survey at that point. You will also be invited to join the focus group when it is held at the end of Semester 1 or 2, or to participate in an individual interview.

How will confidentiality and/or anonymity be protected?

Specific details related to you will remain confidential to the research team of their institution. Numbers will be allocated to your surveys to enable matching of pre and post workshop surveys. Only the research assistant for that area (ie Dunedin or Auckland) and the researcher for the institution will have access to the list that matches numbers to names. Once the analysis of data has been completed, the list of matched numbers to names will be safely destroyed by the researcher.

Anonymity will be assured in presentations or written publications in that participants will not be identified by name. As all reports are authored by the researchers, the location of the participants could be inferred by the reader, however, it will not be possible to identify individuals. While some descriptive statistics may be used in the report, anonymity of each individual's data will be guaranteed.

The researchers may record their experiences of facilitating the workshops and observations of the group using social software tools such as blogs or wikis. Care will be taken to not name individuals participating in the research, their role (apart from generic descriptions such as student, management, administration or lecturer) or the location of their institution.

You may choose to identify your involvement in this study by reflecting on your experiences using social software tools such as blogs, Facebook, Bebo or Twitter. This may mean that others could potentially identify you as having been part of the study. Throughout the workshops you will be reminded of this possibility.

What data or information will be collected and how will it be used?

Data collected include the survey that you complete twice, once at the beginning and once at the end. Points made during the weekly workshop discussions will be noted. Observations made by the researchers during the workshops and subsequent discussion with you may be noted. Your input in the final focus group will also be used. This varied data will be collated and reported on as a whole.

Results of this project will be published in a report submitted to the Ministry of Education but any data included will in no way be linked to any specific participant without prior consent. Results of the project will also be disseminated through conferences or other types of seminar and journal articles. Again the data will be in no way linked to a specific participant. You may request a copy of the results of the project and it will be available from the Ministry of Education.

Data Storage

The data collected will be securely stored in such a way that only those mentioned above will have access to it. At the end of the project any personal information will be destroyed. Any raw data on which the results are based will be retained in secure storage for a period of five years, after which it will be destroyed.

Can participants change their minds and withdraw from the project?

You can decline to participate without any disadvantage to yourself of any kind. If you choose to participate, you may withdraw from the project at any time, without giving reasons for your withdrawal. You can also withdraw any information that has already been supplied until the point at which data analysis has commenced. You can also refuse to answer any particular question in the survey, focus groups or weekly discussions, and if being used ask for the audio to be turned off at any stage or for notes made to be ‘struck out’.

Is there any remuneration for my time?

Yes, there is remuneration. Acknowledging that participants will be involved in this project during outside work and study times, a small remuneration (maximum $400) in recognition of the investment of time is available. Remuneration is based on each individual’s attendance at workshops (ie based on the number of workshops attended) the investment of energy given to the process, and the contribution made to other’s learning either in or outside of the workshop. Participants will be asked to show evidence of how they have met the criteria.

What if participants have any questions?

If you have any questions about the project, either now or in the future, please feel free to contact either:

Merrolee Penman, Lead researcher
School of Occupational Therapy
Otago Polytechnic
(03) 479 6043
021 735 239

Bronwyn Hegarty, Project manager
Educational Development Centre
Otago Polytechnic
(03) 479 3600
021 435 338

merrolee@tekotago.ac.nz Bronwynh@tekotago.ac.nz

Appendix 4 – Consent Form - Recruitment

Consent Form

Project title

An investigation into the digital information literacy capability of tertiary students and staff and its impact on lifelong learning, productivity and workplace innovation in New Zealand.

I have been involved in the discussions concerning this project and have contributed to the design of the project. In doing so, I am aware and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage from the Project Manager, Bronwyn Hegarty or the Lead Researcher, Merrolee Penman.

I know that:

- My participation in the project is based on statements outlined in the sub-contract between my employer and Otago Polytechnic as the lead institution.
- I am free to withdraw at any time without giving reasons.
- Any data collected will be *destroyed* at the conclusion of the project but any raw data on which the results of the project depend will be retained in secure storage for five years after which it will *be destroyed*. If it is to be kept longer than five years my permission will be sought;
- The results of the project will be compiled in a report to the Ministry of Education, as well as presented in research journals and at conferences and seminars.

Additional information given or conditions agreed to

I can withdraw my data from the project up until the time the process of data analysis commences.

I agree to take part in this project under the conditions set out in the Information Sheet.

..... *(signature of participant)*

..... *(date)*

..... *(signature of researcher)*

This project has been reviewed and approved by the Otago Polytechnic Ethics Committee.

Appendix 5 - pre-survey - Instrumentation


StudentSurveys
Home
New Survey
Surveys
Libraries
Templates
Reports
Help
Logout
Modify Survey
Launch
Done
This survey has at least one response. Only limited changes are allowed on a survey with responses. To fully edit this survey, you must first delete all of the responses, which can be done by clicking here.
Digital Information Literacy Project OP
edit
[No Title Entered]
edit page properties
move page
This is a survey for the Digital Information Literacy research project.
edit
move
There are three parts to this questionnaire:
Part A: General information
Part B: Digital information literacy
Part C: Use of and confidence in using computer-based and Internet- based communication and information methods.
The red * indicates a response is required.
PART A: General Information
There are several sections: Status, Student Activity and Teaching Activity.
edit page properties
insert page conditions
remove page break
move page
1. Are you a teacher or student or both?*
edit
move
pipe
Teacher
Student
Both
Status:
In this section please select the item that applies to you.
edit page properties
insert page conditions
remove page break
move page
2. Gender*
edit
move
pipe
Female
Male
3. Ethnicity*
edit
move
pipe
Chinese
Cook Island Maori
Indian
Maori
New Zealand European/Pakeha
Niuean
Samoan
Tongan
Other ethnicity, please specify
4. Age*
edit
move
pipe
15 to 20 years
21 to 30 years
31 to 45 years
46 to 59 years
60 years or older
5. Computer Experience*
edit
move
pipe
Less than one year of experience of computer use
One to two years of experience of computer use
Three years or more of experience with computers

6. **Internet Use***

○ Never use the Internet ○ Infrequent use of Internet ○ Regular use of Internet

edit move pipe

7. **Please state all existing QUALIFICATIONS held - nil - if no qualifications.***

edit move pipe

8. **Please state QUALIFICATIONS currently studying**

edit move pipe

9. **Please state your teaching or study DISCIPLINE***

edit move pipe

10. **State first language/mother tongue***

edit move pipe

Student Activity

Please indicate the type of student you are at present. Teachers if you are not also a student, please check the box *I am not a student.*

edit page properties | insert page conditions | remove page break | move page

11. **Study Type***

edit move pipe

- ☐ I am not a student
- ☐ Full time student
- ☐ Part time student
- ☐ Foundation course student
- ☐ Certificate course student
- ☐ Undergraduate student
- ☐ Postgraduate student
- ☐ Distance student
- ☐ Other, please specify.

Teaching Activity

Please select as many as applicable - If you are a **student** and NOT a teacher, please check the *I am not a teacher* box.

edit page properties | insert page conditions | remove page break | move page

12. **Type of students you teach.***

edit move pipe

- ☐ I am not a teacher
- ☐ Full time student
- ☐ Part time student
- ☐ Foundation course student
- ☐ Certificate course student
- ☐ Undergraduate student
- ☐ Postgraduate student
- ☐ Distance student
- ☐ Other, please specify.

Part B: Information literacy skills

edit page properties | insert page conditions | remove page break | move page

13. Please indicate your level of skill on the following:*

	very low	low	average	high	very high
Using digital or electronic technology for locating, retrieving, analysing and applying information relevant to my study or work	○	○	○	○	○
Using traditional (eg. Texts, libraries) skills in locating, retrieving, analysing and applying information relevant to my study or work	○	○	○	○	○
Familiarity with the New Zealand or Maori contexts of assigned topics	○	○	○	○	○

[No Title Entered]

edit page properties | insert page conditions | remove page break | move page

14. Please indicate the degree to which each of the following applies to you:*

	not at all	a little	somewhat	a lot	very much so
I am moving into situations which require me to apply more sophisticated, information-gathering skills in increasingly demanding academic contexts	○	○	○	○	○
I need to develop my own digital information skills in relation to the location, retrieval, analysis and application of information [in order to support and teach other people].	○	○	○	○	○
I lack confidence in using digital/computer technologies to prepare or create materials because I am unfamiliar with the tools or methods.	○	○	○	○	○

15. Comments about your information literacy skills:

[No Title Entered]

edit page properties | insert page conditions | remove page break | move page

16. **When you are locating, retrieving, analysing or applying digital information, please indicate how often you use the following items.***

	Have never used	Have used at least once	Would like to use more	Prefer not to use	Use less than once a month	Use at least once weekly
Online library databases	○	○	○	○	○	○
Internet search engines	○	○	○	○	○	○
Online directories	○	○	○	○	○	○
Blogs	○	○	○	○	○	○
Social bookmarks - e.g. http//de.lici.ous	○	○	○	○	○	○
Webfeeds/newsreader e.g. bloglines	○	○	○	○	○	○
Book sharing e.g. Google Books, Wikibooks	○	○	○	○	○	○
Computer conferencing e.g. Elluminate, Skype	○	○	○	○	○	○
Email discussion groups	○	○	○	○	○	○
Wikis e.g. Wikipedia, Wikibooks, WikiEducator	○	○	○	○	○	○
File sharing e.g. Google docs	○	○	○	○	○	○
Videosharing websites e.g. YouTube	○	○	○	○	○	○
Photo sharing websites e.g. Flickr	○	○	○	○	○	○
Presentation sharing e.g. Slideshare, MyPLick	○	○	○	○	○	○
Social spaces e.g. Myspace, facebook	○	○	○	○	○	○

17. **When you are locating, retrieving, analysing or applying digital information, please indicate how confident you are using the following items by selecting from the scale provided.***

	Extremely Unconfident	Unconfident	Neither confident nor unconfident	Confident	Extremely Confident
Online library databases	○	○	○	○	○
Internet search engines	○	○	○	○	○
Online directories	○	○	○	○	○
Blogs	○	○	○	○	○
Social bookmarks - e.g. http//de.lici.ous	○	○	○	○	○
Webfeeds/newsreader e.g. bloglines	○	○	○	○	○
Book sharing e.g. Google Books, Wikibooks	○	○	○	○	○
Computer conferencing e.g. Elluminate, Skype	○	○	○	○	○
Email discussion groups	○	○	○	○	○
Wikis e.g. Wikipedia, Wikibooks, WikiEducator	○	○	○	○	○
File sharing e.g. Google docs	○	○	○	○	○
Videosharing websites e.g. YouTube	○	○	○	○	○
Photo sharing websites e.g. Flickr	○	○	○	○	○
Presentation sharing e.g. Slideshare, MyPLick	○	○	○	○	○
Social spaces e.g. Myspace, facebook	○	○	○	○	○

18. **Any other items you use when locating, retrieving, analysing or applying digital information not stated in the previous question.**
Please indicate your level of use and confidence using the scales provided in the previous question. 1 Extremely

unconfident
2 Unconfident
3 Neither confident nor unconfident
4 Confident
5 Extremely confident

pipe

19. **Any other comments about locating, retrieving, analysing or applying digital information, your use and confidence in using.**

edit
move
pipe

Part C

Confidence in the use of computer-based and Internet based communication and information methods.

Please complete the 5 questions in this section using the scale provided

edit page properties | insert page conditions | remove page break | move page

20. **Personal Feelings***

edit
move
pipe

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
I am confident about my ability to teach well in a course that requires me to use computer technology	○	○	○	○	○
I feel at ease learning how to use them	○	○	○	○	○
I am not worried about making mistakes	○	○	○	○	○
I feel anxious about using them	○	○	○	○	○
The thought of using unfamiliar technologies and tools is uncomfortable	○	○	○	○	○
Overall, I believe they enhance my professional skills	○	○	○	○	○
I think learning how to use them is easy	○	○	○	○	○
I enjoy trying different computer technologies and online tools	○	○	○	○	○

21. **Comments about personal feelings.**

edit
move
pipe

[No Title Entered]

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22. **Use of Methods**

Please respond to each of the following questions using the scale provided to indicate your level of confidence in the use of the items listed*

edit
move
pipe

	Extremely unconfident	Unconfident	Neither confident nor unconfident	Confident	Extremely confident	Have not used
Web-based learning management systems - e.g Blackboard	○	○	○	○	○	○
Websites - reading and searching	○	○	○	○	○	○
Discussion Boards/Forums	○	○	○	○	○	○
Computer applications/software - e.g. word processing, spreadsheets, publishing etc	○	○	○	○	○	○
Online Chat e.g. Skype, MSN	○	○	○	○	○	○
Email	○	○	○	○	○	○
Software to create web pages	○	○	○	○	○	○
Computer conferencing e.g Elluminate, Skype, Second Life	○	○	○	○	○	○
e-Journals/e-portfolios	○	○	○	○	○	○
Audio in digital formats	○	○	○	○	○	○
Digital videos	○	○	○	○	○	○

23. **Add others you may have used**

Please also indicate your level of confidence using
1 - Extremely unconfident
2 - Unconfident
3 - Neither confident nor unconfident
4 - Confident
5 - Extremely confident

No Title Entered]

edit page properties | insert page conditions | remove page break | move page

24. **Scenario**

Imagine you have been asked to learn to use some new computer technology or online tool.
Please respond to each question and treat each question independently

How confident would you be ....*

	Extremely unconfident	Unconfident	Neither confident nor unconfident	Confident	Extremely confident
... if there was no one around to tell you what to do as you go	○	○	○	○	○
... if you had only instruction manual for reference	○	○	○	○	○
... if you could call someone for help if you got stuck	○	○	○	○	○
... if someone else had helped you get started	○	○	○	○	○
... if you had a lot of time to learn how to do the task	○	○	○	○	○
... if there was someone giving you	○	○	○	○	○

step by step instructions

25. **Comments**

No Title Entered]

edit page properties | insert page conditions | remove page break | move page

26. **Personal Characteristics**

Please respond to each questions using the scale provided.

In learning to use a new computer technology or online tool, I am more likely to ....*

	Extremely unlike me	Unlike me	Neither like for unlike me	Like me	Extremely like me
...expect that I will experience many problems	○	○	○	○	○
...doubt my ability to solve the problems that may arise	○	○	○	○	○
... need to ask others for help	○	○	○	○	○
... try and persist on my own until it works correctly	○	○	○	○	○
... give up quickly if it doesn't work	○	○	○	○	○
... put a lot of effort into getting it right	○	○	○	○	○
... ask someone else immediately if it doesn't work straight away	○	○	○	○	○
... get someone else to do it for me or fix it	○	○	○	○	○
... spend extra time trying to understand what to do	○	○	○	○	○
... get frustrated and annoyed at lack of progress	○	○	○	○	○

27. **Comments**

No Title Entered]

edit page properties | insert page conditions | remove page break | move page

28. **Overall Confidence***

	Extremely unconfident	Unconfident	Neither confident nor unconfident	Confident	Extremely confident
Overall, how confident are you in					

the use of computer-based and Internet-based communication and information	○	○	○	○	○

No Title Entered]

edit page properties | insert page conditions | remove page break | move page

29. **General comments** - you can add any further information you have thought of here.

No Title Entered]

edit page properties | insert page conditions | remove page break | move page

30. Name:

31. Contact details:
phone and email please.

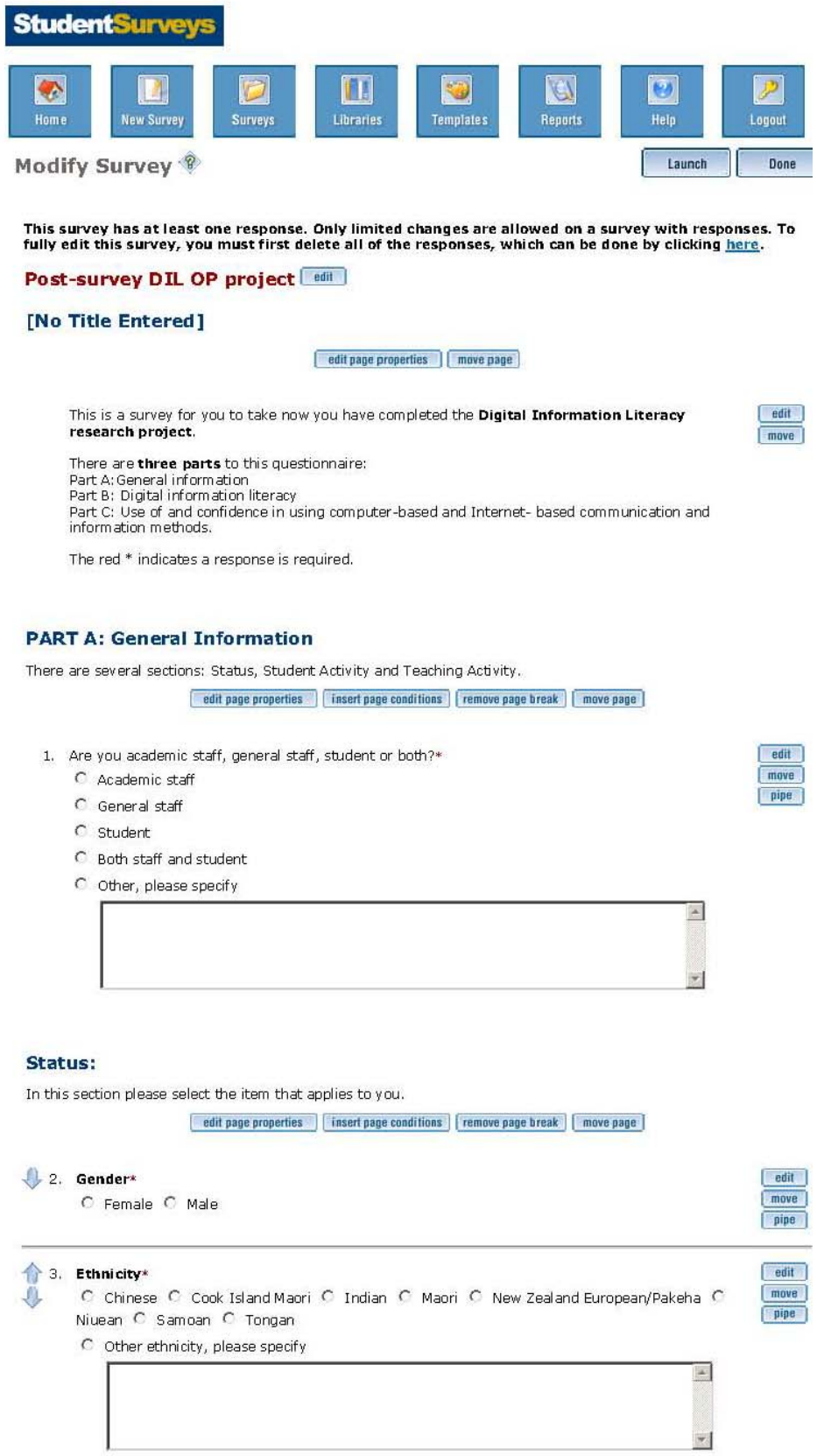
32. **You have now completed the survey. Thank you.**
If you are happy with your answers please select DONE and exit the survey.

If you want to go back and review your answers you can do so, but all responses on the pages you return to will need to be redone.

Once you select DONE you cannot go back to alter your answers.

Contact Bronwynh@tekotago.ac.nz if there is any problem.

Appendix 6 - post-survey - Instrumentation



4. **Age***
○ 15 to 20 years ○ 21 to 30 years ○ 31 to 45 years ○ 46 to 59 years ○ 60 years or older

5. **Computer Experience***
○ Less than one year of experience of computer use ○ One to two years of experience of computer use ○ Three years or more of experience with computers

6. **Internet Use***
○ Never use the Internet ○ Infrequent use of Internet ○ Regular use of Internet

7. **Please state all existing QUALIFICATIONS held - nil - if no qualifications.***

8. **Please state QUALIFICATIONS currently studying**

9. **Please state your teaching or study DISCIPLINE***

10. **State first language/mother tongue***

Student Activity

Please indicate the type of student you are at present. Teachers if you are not also a student, please check the box *I am not a student.*

edit page properties | insert page conditions | remove page break | move page

11. **Study Type***

- ☐ I am not a student
- ☐ Full time student
- ☐ Part time student
- ☐ Foundation course student
- ☐ Certificate course student
- ☐ Undergraduate student
- ☐ Postgraduate student
- ☐ Distance student
- ☐ Other, please specify.

Teaching Activity

Please select as many as applicable - If you are a **student** and NOT a teacher, please check the *I am not a teacher* box.

edit page properties | insert page conditions | remove page break | move page

12. **Type of students you teach.***

- [ ] I am not a teacher
- [ ] Full time student
- [ ] Part time student
- [ ] Foundation course student
- [ ] Certificate course student
- [ ] Undergraduate student
- [ ] Postgraduate student
- [ ] Distance student
- [ ] Other, please specify.

Part B: Information literacy skills

edit page properties | insert page conditions | remove page break | move page

13. Please indicate your current level of skill on the following:*

	very low	low	average	high	very high
Using digital or electronic technology for locating, retrieving, analysing and applying information relevant to my study or work	○	○	○	○	○
Using traditional (eg. Texts, libraries) skills in locating, retrieving, analysing and applying information relevant to my study or work	○	○	○	○	○
Familiarity with the New Zealand or Maori contexts of assigned topics	○	○	○	○	○

[No Title Entered]

edit page properties | insert page conditions | remove page break | move page

14. Please indicate the degree to which each of the following applies to you:*

	not at all	a little	somewhat	a lot	very much so
I am moving into situations which require me to apply more sophisticated, information-gathering skills in increasingly demanding academic contexts	○	○	○	○	○
I need to develop my own digital information skills in relation to the location, retrieval, analysis and application of information [in order to support and teach other people].	○	○	○	○	○
I lack confidence in using digital/computer technologies to prepare or create materials because I am	○	○	○	○	○

unfamiliar with the tools or methods.

15. Describe changes, if any, in your digital information literacy skills since you started the project:*

Answer

No Title Entered]

edit page properties | insert page conditions | remove page break | move page

16. **When you are locating, retrieving, analysing or applying digital information, please indicate how often you use the following items:***

	Have never used	Have used at least once	Would like to use more	Prefer not to use	Use less than once a month	Use at least once weekly	Do not know what this is
Online library databases	○	○	○	○	○	○	○
Internet search engines	○	○	○	○	○	○	○
Online directories	○	○	○	○	○	○	○
Blogs	○	○	○	○	○	○	○
Social bookmarks - e.g. http//de.lici.ous	○	○	○	○	○	○	○
Webfeeds/newsreader e.g. bloglines	○	○	○	○	○	○	○
Book sharing e.g. Google Books, Wikibooks	○	○	○	○	○	○	○
Computer conferencing e.g. Elluminate, Skype	○	○	○	○	○	○	○
Email discussion groups	○	○	○	○	○	○	○
Wikis e.g. Wikipedia, Wikibooks, WikiEducator	○	○	○	○	○	○	○
File sharing e.g. Google docs	○	○	○	○	○	○	○
Videosharing websites e.g. YouTube	○	○	○	○	○	○	○
Photo sharing websites e.g. Flickr	○	○	○	○	○	○	○
Presentation sharing e.g. Slideshare, MyPLick	○	○	○	○	○	○	○
Social spaces e.g. Myspace, facebook	○	○	○	○	○	○	○

17. List the tools and methods, you have begun to use since the project started.*

Answer

18. **When you are locating, retrieving, analysing or applying digital information, please indicate how confident you are using the following items by selecting from the scale provided.***

	Extremely Unconfident	Unconfident	Neither confident nor unconfident	Confident	Extremely Confident	Do not know what this is
Online library databases	○	○	○	○	○	○
Internet search engines	○	○	○	○	○	○
Online directories	○	○	○	○	○	○
Blogs	○	○	○	○	○	○
Social bookmarks - e.g. http//de.lici.ous	○	○	○	○	○	○
Webfeeds/newsreader e.g. bloglines	○	○	○	○	○	○

Book sharing e.g. Google Books, Wikibooks	○	○	○	○	○	○
Computer conferencing e.g. Elluminate, Skype	○	○	○	○	○	○
Email discussion groups	○	○	○	○	○	○
Wikis e.g. Wikipedia, Wikibooks, WikiEducator	○	○	○	○	○	○
File sharing e.g. Google docs	○	○	○	○	○	○
Videosharing websites e.g. YouTube	○	○	○	○	○	○
Photo sharing websites e.g. Flickr	○	○	○	○	○	○
Presentation sharing e.g. Slideshare, MyPLick	○	○	○	○	○	○
Social spaces e.g. Myspace, facebook	○	○	○	○	○	○

19. **Any other items you use when locating, retrieving, analysing or applying digital information not stated in the previous question.**
Please indicate your level of use and confidence using the scales provided in the previous question. 1 Extremely unconfident
2 Unconfident
3 Neither confident nor unconfident
4 Confident
5 Extremely confident

edit move pipe

20. **Any other comments about locating, retrieving, analysing or applying digital information, your use and confidence in using.**

edit move pipe

21. Outline changes, if any, in your levels of confidence using digital information methods and tools. *

Answer

edit move pipe

Part C

Confidence in the use of computer-based and Internet based communication and information methods.

Please complete the 5 questions in this section using the scale provided

edit page properties | insert page conditions | remove page break | move page

22. **Personal Feelings***

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	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
I am confident about my ability to teach well in a course that requires me to use computer technology	○	○	○	○	○
I feel at ease learning how to use them	○	○	○	○	○
I am not worried about making mistakes	○	○	○	○	○
I feel anxious about using them	○	○	○	○	○
The thought of using					

unfamiliar technologies and tools is uncomfortable	○	○	○	○	○
Overall, I believe they enhance my professional skills	○	○	○	○	○
I think learning how to use them is easy	○	○	○	○	○
I enjoy trying different computer technologies and online tools	○	○	○	○	○

23. **Comments about personal feelings.**

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24. **Use of Methods**

Please respond to each of the following questions using the scale provided to indicate your level of confidence in the use of the items listed*

	Extremely unconfident	Unconfident	Neither confident nor unconfident	Confident	Extremely confident	Have not used
Web-based learning management systems - e.g Blackboard	○	○	○	○	○	○
Websites - reading and searching	○	○	○	○	○	○
Discussion Boards/Forums	○	○	○	○	○	○
Computer applications/software - e.g. word processing, spreadsheets, publishing etc	○	○	○	○	○	○
Online Chat e.g. Skype, MSN	○	○	○	○	○	○
Email	○	○	○	○	○	○
Software to create web pages	○	○	○	○	○	○
Computer conferencing e.g Elluminate, Skype, Second Life	○	○	○	○	○	○
e-Journals/e-portfolios	○	○	○	○	○	○
Audio in digital formats	○	○	○	○	○	○
Digital videos	○	○	○	○	○	○

25. **Add others you may have used**

Please also indicate your level of confidence using
1 - Extremely unconfident
2 - Unconfident
3 - Neither confident nor unconfident
4 - Confident
5 - Extremely confident

26. **Scenario**

Imagine you have been asked to learn to use some new computer technology or online tool.
Please respond to each question and treat each question independently

How confident would you be ....*

	Extremely unconfident	Unconfident	Neither confident nor unconfident	Confident	Extremely confident
... if there was no one around to tell you what to do as you go	○	○	○	○	○
... if you had only instruction manual for reference	○	○	○	○	○
... if you could call someone for help if you got stuck	○	○	○	○	○
... if someone else had helped you get started	○	○	○	○	○
... if you had a lot of time to learn how to do the task	○	○	○	○	○
... if there was someone giving you step by step instructions	○	○	○	○	○

27. **Comments**

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28. **Personal Characteristics**

Please respond to each questions using the scale provided.

In learning to use a new computer technology or online tool, I am more likely to ....*

	Extremely unlike me	Unlike me	Neither like for unlike me	Like me	Extremely like me
...expect that I will experience many problems	○	○	○	○	○
...doubt my ability to solve the problems that may arise	○	○	○	○	○
... need to ask others for help	○	○	○	○	○
... try and persist on my own until it works correctly	○	○	○	○	○
... give up quickly if it doesn't work	○	○	○	○	○
... put a lot of effort into getting it right	○	○	○	○	○
... ask someone else immediately if it doesn't work straight away	○	○	○	○	○
... get someone else to do it for me or fix it	○	○	○	○	○

... spend extra time trying to understand what to do	○	○	○	○	○
... get frustrated and annoyed at lack of progress	○	○	○	○	○

29. **Comments**

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30. **Overall Confidence***

	Extremely unconfident	Unconfident	Neither confident nor unconfident	Confident	Extremely confident
Overall, how confident are you in the use of computer-based and Internet-based communication and information	○	○	○	○	○

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31. Explain why you believe there have been changes, if any, in your levels of confidence with digital information.*
For example, are you more likely to try new methods and not worry so much about making mistakes and do you find the experience more enjoyable?

Answer

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32. **General comments** - you can add any further information you have thought of here.

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33. Name:

34. Contact details:
phone and email please.

You have now completed the survey. Thank you.

If you are happy with your answers please click **DONE** once only and exit the survey.

Note: the CLOSE button is not working.

If you want to go back and review your answers you can do so, but all responses on the pages you return to will need to be redone.

Once you select DONE you cannot go back to alter your answers.

Contact Bronwynh@tekotago.ac.nz if there is any problem.

Appendix 7 - focus group interview Questions - Instrumentation

Based on brainstorm on Monday, these are the main questions and sub questions that we want to cover in all focus groups. We also had some prompting or expanding questions which can be used to draw out the information we are seeking to answer the research questions. As a reminder here are the research questions:

1. Investigate how staff and students access, and interpret digital information creating their own understandings using purpose built modules which are customisable and Web 2.0 strategies

2. Ascertain how personal online learning environments and membership in a social networked community can influence DIL

3. Indicate how important DIL is for lifelong learning of staff and students (including Maori and Pasifika) productivity and innovation

4. Determine the standard of DIL in the New Zealand academic workplace compared with other OECD countries

Question 1:

What does the term digital information literacy mean to you?

In this project, our definition of digital information literacy is based on being able to access, interpret and create information. How do these terms relate to what you did in the project? Do you agree with the terms access, interpret and create? If so, why do you agree, if not, why not?

(If group is stuck then a prompting question may be…. Can you tell the group one of the main things you did in the project? How did you go about doing that? Encourage discussion, ideas around access, interpret and create information)

Question 2:

In the project, how connected did you feel with the members of the group and did this work better for you face to face, or in online forums?

Who did you seek help from when you were needed answers to your questions? Who helped you, and who did you help out? What means did you use to communicate (online or face to face), and which worked better you?

Did having a sense of connection affect your motivation to learn new skills? Were you connected enough?

Question 3:

When you were in the project, how did you organise and keep track of what they were learning? In our project we refer to a personal learning environment, What do you understand a personal learning environment to be? Did you have an online environment? If not, what other medium/tools did you use for managing and keeping track of your learning.

Question 4:

How important has this learning been for your ongoing learning? Do you think the project will help you keep learning more about digital ??

Do you think that learning about the tools willbe more productive and innovative from here on in? Ask for examples to illustrate points.

(lifelong learning = "It's never too soon or too late for learning")

Question 5:

How well did this project assist you to address your needs/problems/issues?How did the project help you to approach digital information, and do you feel more knowledgeable and confident in the use of Web 2.0 tools, social networking, personal learning environments, online modules.

What learning will you take from this project?? Where to from now? what do you plan to do?

Processes for focus groups

- Start - tea/coffee, opportunity to catch up
- Review the goals of the project - discuss how information will be recorded and used
- Questions?? - brainstorm in small groups and feedback to larger group - to get all to respond?
- Digitally record and also take digital photos of what is on whiteboard, unless we have electronic whiteboards

Appendix 8 – Tables of Self-efficacy scores - Data Analysis

Self-efficacy scores

Scores for each aspect of self-efficacy measured in the pre and post-surveys are collated in this section. These formed part of the overall DIL score, and require further analysis to determine individual self-efficacy scores for participants.

Table 14: Pre-survey scores for self-efficacy characteristics - Personal feelings.

pre-survey								
In context of using computer technologies and online tools				**% Frequency of responses Likert Scale**				
Personal Feelings	**Mean**	**Median**	**Mode**	1	2	3	4	5
confidence to teach well	3.2	3	4	9	26	21	28	16
at ease learning	3.5	4	4	7	12	23	40	19
not worried about mistakes	3.6	4	4	5	21	5	49	28
anxious using*	3.5	3	5	5	21	26	21	28
thought of using is uncomfortable*	3.3	3	5	7	26	19	23	26
computer technologies enhance learning	4.6	5	5	0	0	2	33	65
learning is easy	3.0	3	2	9	19	21	26	12
enjoy using	4.0	4	4	2	2	21	44	30

Note:* indicates questions where Likert responses were reversed to calculate the score

Table 15: Post-survey scores for self-efficacy characteristics - Personal feelings.

post-survey								
In context of using computer technologies and online tools				**% frequency of responses Likert Scale**				
Personal Feelings	**Mean**	**Median**	**Mode**	**1**	**2**	**3**	**4**	**5**
confidence to teach well	3.6	4	4	3	11	27	46	14
at ease learning	4.1	4	4	0	5	11	54	27
not worried about mistakes	4.0	4	4	0	11	5	54	30
anxious using*	4.0	4	4	0	8	11	57	24
thought of using is uncomfortable*	3.8	4	4	0	11	22	49	19
computer technologies enhance learning	4.5	5	5	0	3	3	38	57
learning is easy	3.3	3	3	5	8	46	30	11
enjoy using	4.3	5	5	0	8	3	38	51

Table 16: Pre-survey scores for self-efficacy characteristics – Use of Methods.

pre-survey									
Confidence in using the listed tools/methods					**% frequency of responses Likert Scale**				
Use of Methods	**Not used***	**Mean**	**Median**	**Mode**	**1**	**2**	**3**	**4**	**5**
LMS	5	3.2	4	4	16	11	21	45	8
websites	0	4.0	4	4	0	5	19	47	30
discussion boards	4	3.1	3	4	8	28	18	38	8
computer applications	0	3.7	4	4	5	9	19	42	26
chat	6	3.0	3	4	16	22	24	24	14
email	1	4.5	5	5	0	2	5	31	62
webpage software	8	2.3	2	1	43	17	9	29	3
computer conferencing	10	2.1	2	1	42	21	18	18	0
e-journals	8	2.4	3	1	34	14	31	17	3
digital audio	8	2.5	2	1	34	23	14	20	9
digital video	6	2.4	2	1	35	27	11	19	8

* This figure is the number of participants who chose the “have not used” response. They were not included in the % calculations for confidence.

Table 17: Post-survey scores for self-efficacy characteristics – Use of Methods.

post-survey									
Confidence in using the listed tools/methods					**% frequency of responses Likert Scale**				
	Not used*	**Mean**	**Median**	**Mode**	**1**	**2**	**3**	**4**	**5**
LMS	5	3.5	4	4	0	3	9	63	25
websites	0	4.6	5	5	0	0	3	38	59
discussion boards	2	3.9	4	4	0	6	9	57	29
computer applications	0	4.1	4	4	3	3	5	57	32
chat	5	3.4	4	4	0	13	19	38	31
email	0	4.8	5	5	0	0	0	22	78
webpage software	3	2.9	3	3	9	21	32	24	15
computer conferencing	5	2.9	3	4	0	22	28	38	13
e-journals	5	3.0	3	3	0	16	41	28	16
digital audio	4	3.0	3	4	0	27	24	36	12
digital video	2	3.1	3	4	3	23	29	34	11

*This figure is the number of participants who chose the “have not used” responses. They were not included in the % calculations for confidence.

Table 18: Pre-survey scores for self-efficacy characteristics – Scenario.

pre-survey								
Confidence in learning new computer technology or online tools				**% frequency of responses Likert Scale**				
Scenario	**Mean**	**Median**	**Mode**	**1**	**2**	**3**	**4**	**5**
no help as you go	2.9	3	4	14	21	26	37	2
only instruction manual	3.2	3	4	9	19	23	44	5
call someone for help	3.9	4	4	2	7	14	53	23
help getting started	4.0	4	4	0	5	9	63	23
lot of time	4.2	4	4	0	0	14	51	35
step by step instructions	4.3	4	5	0	2	9	42	47

Table 19: Post-survey scores for self-efficacy characteristics – Scenario.

post-survey								
Confidence in learning new computer technology or online tools				**% frequency of responses Likert Scale**				
Scenario	**Mean**	**Median**	**Mode**	**1**	**2**	**3**	**4**	**5**
no help as you go	3.4	3.5	4	0	11	39	47	3
only instruction manual	3.5	4	4	3	17	19	53	8
call someone for help	4.3	4	5	0	0	17	42	42
help getting started	4.3	4	4	0	0	11	47	42
lot of time	4.3	4	4	0	0	11	47	42

step by step instructions	4.4	5	5	0	0	17	22	61

Table 20: Pre-survey scores for self-efficacy characteristics – Personal characteristics.

pre-survey								
Learning to use new computer technology or online tools	**Efficacy**			**% Frequency of Responses Likert Scale**				
Personal characteristics	**Mean**	**Median**	**Mode**	**1**	**2**	**3**	**4**	**5**
expect problems*	2.8	3	3	12	23	35	28	2
doubt ability to solve problems*	3.3	4	4	9	14	21	47	9
ask others for help*	2.4	2	2	14	47	23	14	2
persist on own	3.6	4	4	2	14	21	51	12
give up quickly*	3.4	4	4	9	14	19	47	12
lot of effort	3.6	4	4	5	12	16	56	12
ask immediately for help*	3.1	3	4	7	19	35	40	0
someone else to fix*	3.5	4	4	5	12	30	40	14
spend extra time to understand	3.6	4	4	2	12	14	65	7
get frustrated at lack of progress**	-	3	2	21	26	26	23	5

* indicates questions where Likert responses were reversed to calculate the scores
** this question was eliminated from mean efficacy scoring

Table 21: Post-survey scores for self-efficacy characteristics – Personal characteristics.

post-survey								
Learning to use new computer technology or online tools				**% Frequency of Responses Likert Scale**				
Personal characteristics	**Mean**	**Median**	**Mode**	**1**	**2**	**3**	**4**	**5**
expect problems*	**2.9**	**3**	**3**	6	31	33	25	6
doubt ability to solve problems*	**3.5**	**4**	**4**	0	19	22	44	14
ask others for help*	**2.6**	**2**	**2**	3	53	28	17	0
persist on own	**3.8**	**4**	**4**	0	8	22	47	22
give up quickly*	**3.6**	**4**	**4**	3	14	19	44	19
lot of effort	**3.9**	**4**	**4**	3	8	14	50	25
ask immediately for help*	**3.4**	**4**	**4**	3	25	17	44	11
someone else to fix*	**3.2**	**3**	**4**	3	25	31	31	11
spend extra time to understand	**3.8**	**4**	**4**	3	8	11	61	17
get frustrated at lack of progress**	**-**	**2.5**	**2**	6	44	22	22	6

* indicates questions where likert responses were reversed to calculate the scores
** this question was eliminated from mean efficacy scoring

Table 22: Pre and post-survey scores for self-efficacy characteristics – Overall confidence.

pre-survey								
Use of computer–based and Internet based communication and information (n=42)				**% Frequency of Responses on five-point Likert Scale**				
Overall confidence	Mean	Median	Mode	1	2	3	4	5
	3.3	**4**	**4**	7	16	23	42	12
post-survey								
Use of computer–based and Internet based communication and information. (n=37)				**% Frequency of Responses on five-point Likert Scale**				
Overall confidence	**Mean**	**Median**	**Mode**	1	2	3	4	5
	4.0	**4**	**4**	0	6	14	56	25

Appendix 9 - Template of criteria for developing case studies - Data Analysis

Project Objective A. Investigate how staff and students access, and interpret digital information creating their own understandings using purpose built modules which are customisable and Web 2.0 strategies.

What was the person's starting point in terms of their knowledge/ skills/feelings or attitude ….to of/in/about tools, techniques, social factors, learning etc	
What was the person's goals in terms of their knowledge/skills/feelings or attitude ….to of/in/about tools, techniques, social factors, learning etc	
What did the person do to achieve their goals?	
What did the person learn in terms of their knowledge/skills/feelings or attitude ….to of/in/about tools, techniques, social factors, learning etc	
Did the person achieve their goals (set or not set)?	

Project Objective B. Ascertain how personal online learning environment and membership in a social networked community can influence digital information literacy.

Specific questions to address this project objective:

Change(s) in K/S/A? Identify enablers/barriers in terms of: • individual factors (personality, motivation, etc...) • environmental factors (social, physical etc...) • activities/processes undertaken (structure, etc..)	
No change(s) in K/S/A? Identify in terms of: • individual factors (personality, motivation, etc...) • environmental factors (social, physical etc...) • activities/processes undertaken (structure, etc..)	

Project Objective C. Indicate how important digital information literacy is for lifelong learning of staff and students (including Maori and Pasifika), productivity and innovation.

Specific questions to address this project objective:

Intention to engage with DI, tools, use of words productive, efficient, effective, innovation. *write a brief statement that summarises these aspects and combine with quotes where appropriate.*	

Appendix 10 - A working example of the analysis and Interpretation process using the individual case study template - Data Analysis

Used pre-survey and post-survey, blog or journal, emails, workshop observations, focus group interviews, action research cycle. (Note: it is not complete.)

Research question One: Investigate how staff and students access, and interpret digital information creating their own understandings using purpose built modules which are customisable and Web 2.0 strategies.

What was the person's starting point in terms of their <u>knowledge/ skills/feelings or attitude</u> ….to of/in/about tools, techniques, social factors, learning etc	Under each heading put the text which supports the interpretations you are making using the DIL and capability categories as a guide. 1. Evidence from blog/journal **Recognised** number of tools available, but unsure where to start. **Recognised** that collectively the group had had wide skill base **Self-assessment** that skill base is minimal in personald diary **Beliefs –** felt overwhelmed by first emails within the group. **Recognised** that there are a lot of digital tools available and not quite sure where to start, not appearing to be **curious?** **Evidence** Post 1: "I wasn't at all sure what to expect coming into the project and was impressed with people's planned goals. Many of the members are very creative digitally and I had no idea of the wealth of software that is there for the using. I was among those who laid claim to being the most digitally illiterate." "I was surprised to learn from one of our teachers	**Summary of all points** K started the project as believing that she was overall **neither confident or unconfident** with DIL, although she had higher confidence in tools that she used such as search engines, office applications and email. K is m**otivated** towards trying different computer technologies, as she **believes** they can be very beneficial, but in the first session also felt **overwhelmed** by the diversity of tools that people were showing/describing. K's **Confidence** increases if able to call someone for help, describes self as **persistent,** and will attempt to solve the **problem** by giving more time and putting effort into getting it right. **Exposed** to ethical issues such as lack of control over information in the first session. <u>Skills</u> Although rated herself as having average skill use for digital technology, and for using traditional skills, she **recognised** that she was moving into situations requiring more advanced skills, and once **exposed** to the range of tools in the first session, K **reflected** that her skill base was minimal in comparison to others.

	that he personally withdrew from Facebook, because (as I understood it) the CIA was in there, with access to everyone's data, and generally he was not impressed with their information management policy. I felt a bit nervous about this – I use Facebook only to be nosey about what my overseas kids are doing. I don't understand much about the risks. However I do believe that access to information and perhaps information itself is controlled to a large extent, and that global business organisations are probably the controllers." "Overall I feel quite excited about it all – especially the writing resources part! The group itself also represents an opportunity for networking (thanks to Sarah, especially!), and for meeting new people." 2. Evidence from emails 3. Evidence from workshop observations and notes 4. Evidence from action cycles 5.Evidence from focus groups – do this later 6. evidence from pre & post-surveys **Attitude/belief** Somewhat lacking in **confidence** in online databases and online directories, but confident in Internet search engines, overall rates self as **neither confident or unconfident**. Believes that tools enhance professional skills. **Motivated** towards trying different computer technologies. Is **confident** user of websites, office applications,	

	email. **Confidence** increases if able to call someone for help, describes self as **persistent,** and will attempt to solve the **problem** by giving more time and putting effort into getting it right. **Knowledge** **Self assesses,** wants more indepth knowledge as shown in number of tools never used, **Skills** Average skill use for digital technology, using traditional skills, but **recognised** that she was moving into situations requiring more advanced skills.	
What was the person's goals in terms of their knowledge/skills/feelings or attitude ….to of/in/about tools, techniques, social factors, learning etc	1. Evidence from blog/journal Three goals a) to set up database of information related to textiles – needed **knowledge of** tools to do this b) Learn about academic writing tools, that could be used to present the database to students and staff c) Learn to use basic communication tools (community) to facilitate a more informed communication resource. 2. Evidence from emails 3. Evidence from workshop observations and notes 4. Evidence from action cycles Goals a and c identified in action research cycle.	K had three different but connected goals which were to set up a database of textile resources, to find ways of communicating to others about this new database, and to learn about academic writing tools. This third goals did not appear to be focused on in the action research cycles. K's goals were about **recognising** or becoming **aware** of what tools were available, to **evaluate** the tool against criteria such as usefulness, **and** to develop **skill** in **applying or using** the tool to meet her identified goal.

	Recognised a need for a resource, and for it to be communicated to potential users 5.Evidence from focus groups – do this later 6. evidence from pre & post-surveys	
What did the person do to achieve their goals?	1. Evidence from blog/journal Developed powerpoint, **applied** new learning about effective powerpoints. **Evaluated** and discounted tools of presentation – wiki, animoto and video, decided to use powerpoint. **Evaluated** own powerpoint against others, **Applied** learning about powerpoint, created powerpoint of textile resources **Accessed** wikie educator, and evaluated use for textile database, determined not appropriate for goal of project. 2. Evidence from emails 3. Evidence from workshop observations and notes 4. Evidence from action cycles **Exposed** self to range of tools in workshops weeks 1 – 5 including, bliptv, youtube, linux, podcasting (from personal diary/blog), wikieducator, goldwave, wetpaint, slideshare, myplick and citeulike, Google docs **Technical aptitude,** developing skills in use of	In her blog, K identifies the ways in which she divided her energies at each session. She was **curious** about what tools others were finding, **observing**, and on the basis of a low level of **engagement**, determined with the tool would be the most effective in organising the resources (**evaluating).** While being **aware** of new tools, she also selected one tool to further develop her skill in using. K did this by **creating** a powerpoint presentation of resources related to her interest in textiles. In doing this, she **evaluated** online powerpoints created byothers, and **sought information** from leaders in the group.

	powerpoint 5.Evidence from focus groups – do this later 6. evidence from pre & post-surveys	
What did the person learn in terms of their <u>knowledge/skills/feelings or attitude</u> ….to of/in/about tools, techniques, social factors, learning etc	1. Evidence from blog/journal **Reflected** in second week that there was much to think about – **recognising** what could be used **Recognised** that information could be located on youtube or bliptv. Demonstrated **curiosity** "I am listening to all the information (**exposed),** and am looking forward to investigating further. Week 3 **technical aptitude** and **self-assess,** technical info interesting, but way beyond her ability to use at present. In week 4 set up own blog, but **anxious**, bit scary but will have a go. **Managed** new information by making brief notes in her personal diary about the tool, how to use and who was using or shared info **Reflects** on value of PowerPoint as a visual resume of her work Plans headings for to **manage** the database As project progresses – continues to be **exposed,** has **accessed** some by looking briefly at them and **evaluates** according to potential usefulness in the	K gained a greater understanding of the range of tools that could be of potential use, thus **recognising** what might be available. K demonstrated some skill in keeping track of, or **managing** her new learning, with brief notes about how to use a tool, the name of the tool, how to access, and who in the group presented or used the tool. This was an aide for her to use later when she might wish to pick up another tool relevant to her needs. K used her time in the workshops to make sure she was **exposed** to a range of tools, not so much **information seeking** as just **observing** and at some times, **engaging** a little with the tool K **reflected** on her own level of **technical aptitude** noting that while some of the technical info was interesting, it was beyond her ability to use. K also **reflected** on the use of blogging as a tool for reflection, she was anxious and found it scary (which doesn't necessarily match with her precourse survey), as it was too exposing, and.. she didn't have the **aptitude** for a simlar paper based tool (a diary).

	future. **Accessed** the knowledge of others by discussing what she was doing, seeking guidance/advice as well as **accessed** web resources, although doesn't describe what or where, or whether evaluated, or applied. Engages in some elements of **problem solving** eg thinking about where to publish powerpoint, and identifies plan of tools to consider (wordpress and wetpaint) **Self assesses** use of blog, feels it is difficult as she **believes** that it is too exposing, and that she is not good at keeping diaries Feels **frustrated** when days work lost. 2. Evidence from emails 3. Evidence from workshop observations and notes 4. Evidence from action cycles 5.Evidence from focus groups – do this later 6. evidence from pre & post-surveys	
Did the person achieve their goals (set or not set)?	1. Evidence from blog/journal 2. Evidence from emails 3. Evidence from workshop observations and notes	*There was evidence that X had moved some way towards achieving their original goal A. At the outset X did not know how to do A (insert quote/response from survey etc) but by the end of 10 sessions she could do many parts of A independently (insert quotes, responses from post survey etc) and knew where to go for support to do the other parts (insert quotes, responses from post survey etc) .*

	4. Evidence from action cycles Achieved part of these, identified that a database would be most useful, and that learning to use a powerpoint would help her to learn about presentation and layout for an online database. Second cycle was to start to explore powerpoint 5.Evidence from focus groups – do this later 6. evidence from pre & post-surveys	K did achieve her first goal of increasing her knowledge and awareness of various tools that may assist her in the goal of having an online textile database. Having **evaluated** the tools, she selected powerpoint and moved some way towards developing a powerpoint that met her criteria.

Research question two: Ascertain how personal online learning environment and membership in a social networked community can influence digital information literacy.

Specific questions to address this project objective:

Change(s) in K/S/A? Identify enablers/barriers in terms of: • individual factors (personality, motivation, etc...) • environmental factors (social, physical etc...) • activities/processes undertaken (structure, etc..)	**Survey comparisions and other evidence** 1. pre-survey 2. post-survey 3. Evidence from blog/journal 4. Evidence from emails 5. Evidence from workshop observations and notes 6. Evidence from action cycles	**Summary** K increased her level of school from average to high on using digital technologies for locating, retrieving analysing and applying information (she also did this for traditional tools). K also saw that while she needs to develop her DIL skills, this is not as great a need as before the project. K was using some tools more than previously – blogs once a week as opposed to never used, and other tools rated as like to use more, whereas before had been never used. Levels of confidence had decreased in use of online databases, but improved on tools used – Internet search engines, online directories, blogs, Google books/wikibooks, email discussion groups, Google docs, presentation sharing. On some of the newer tools eg creating web pages, computer conferencing and ejournals, K changed from having not used to being an **unconfident** learner Overall K identified that she is more **confident** with usage and location of tools, and she has been **exposed** to new information and tools to look at later. She is more at ease, is less worried about making mistakes, **believes** it is easier to learn. While confidence did not change, overall K feels more confident trying new things. Environmental factors have supported a change in confidence with K identifiying that she is confident now with either an instruction manual,

		having a lot of time to learn, and if someone is there to assist with instructions. K's perceptions of her approach to learning remained relatively unchanged, although she identified that it was now like her to ask people for help.
No change(s) in K/S/A? Identify in terms of: • individual factors (personality, motivation, etc...) • environmental factors (social, physical etc...) • activities/processes undertaken (structure, etc..)		

Research question three: Indicate how important digital information literacy is for lifelong learning of staff and students (including Maori and Pasifika), productivity and innovation.

Specific questions to address this project objective:

Intention to engage with DI, tools, use of words productive, efficient, effective, innovation. *write a brief statement that summarises these aspects and combine with quotes where appropriate.*	1. Evidence from focus group interview 2. Evidence from blog/journal 3. Evidence from emails 4. Evidence from workshop observations and notes	No evidence of plans to continue to, although has stated goal of where to publish her outputs from the project – Powerpoints.

Appendix 11 - Questions for developing Institutional case studies - Data Analysis

Questions for the group.

1. Review goals of your group –
   a) Expectations of what might be achieved – usually written as some type of goal at start of the project

	How many?	Examples of types of goals (quote from case studies)
Attitude goals		
Knowledge goals		
Skills goals		

   b) What goals they added in and goals modified

	How many?	Examples of types of goals (quotes from case studies)
Attitude goals		
Knowledge goals		
Skills goals		

   c) How many in the group adjusted their goals during the project? Give examples of the types of reasons for adjusting goals (quotes where possible).
   d) Any insights/thoughts you had about why goals changed?

2. Tools explored/used etc – aiming to get a sense of what they learnt

Name of tool	Record no of people who used the workshop to explore or use the tool, or use more effectively	Which of these did you run specific sessions on

3. **Group summaries** – can we organise these under the same headings as D.
In my reading of the cases I saw similar trends across the groups as follows:

Having a time set for the project was really valuable – it gave 'protected time' to play with and work towards that achieving their goals – out of workshop activity/investment in time varied across the groups. Often practiced on tools they had tried in the workshop.

A number of different processes were used by participants to achieve their goals. Some participants had very specific goals that could be achieved in the time in the project. They appeared to work systematically towards achieving the in methodical ways recording their progress.

Some of the participants had thought they knew more than they did. This group often showed surprise at the number of tools that were freely or easily available to support their study or work that they hadn't known about. Participants who experienced this sudden awareness of what they didn't know often adjusted their goals for their project. They often deliberately chose to put aside their initial goals in order to be able to explore the range of tools others in the group were using, or were learning to use. These participants chose to be 'exposed' to the range of tools. Usually they took enough time to get a 'feel' for the tool, they made notes or in some way recorded something they wanted to remember about the tool so that they could come back at a later point after the project. As such they were 'evaluating' the tool against their own set criteria, which commonly was about the value the tool would have in supporting their ongoing study or work. Each participant usually selected a tool that they felt would be useful for them at present, practising and developing confident in the use of this tool while in the workshops. This group sometimes scored self lower at end of project as they became aware of what it was they didn't know.

Another group of participants tended to be the explorers – they often had more experience of using a range of tools, and weren't concerned about taking risks. This group exposed themselves to a range of tools, trying out features of the tools, and determining what would meet their needs. This group seemed to approach their learning more haphazardly, but still met their needs. Play with support rather than play on their own, having someone standing behind (oriels comment)

Few participants outlined their criteria for determining whether a tool of process was meeting their needs. Their reflections usually introduced their need, listed the options they intended to explore, or had explored and then a solution (or one of the tools) was selected for ongoing use. Criteria listed tended that the tool seemed to be the one that would work best for them. This statement hints at a number of criteria that were not ever explicitly communicated.

Seemed to be an expectation they would use online groups/support, but it didn't happen very often – in general, seemed to need the personal support, or individual sessions – holding hands. Two in Institution Three used online support groups, but in part there was no=one in the group to help. Access for at least one institution was problematic for Web 2.0 tools thus limiting options for people as well.

Learning occurred across the knowledge, skill and attitude domains. While pre workshop goals tended to be skill focused, these goals were adjusted as the project workshops rolled out over the 10 weeks. For some the learning happening remained predominantly at the skill level with participants developing skills in tool use, for others learning also occurred in the knowledge and attitude domains. For some individuals, particularly those who rated themselves lower in knowledge of, and skills in using the tools, the major learning was not in development of skills but in the changing of previously held beliefs about either themselves or the technology. Participants described the need to 'get over myself', "realising that my attitude is all I need to change to be able to do anything I want in this area". For these participants, the barriers to learning or developing their digital information literacy came not from time or costs, or lack of opportunities, but from within, that is their attitude to learning to use

technology. This group learnt to ‘persist’ when issues arose, rather than to try give up or try to find someone else to assist them with the task they had chosen.

Learning appeared to be consolidated, and confidence enhanced when the participants were able to not only communicate within the group, but were able to communicate more effectively about the tools with other colleagues, or more often with family and friends. Participants discussed their feelings of satisfaction when they were able to join in conversations with others about specific tools, or even just understand the language of others. Some discussed how, prior to the project, they would ‘turn off’ to such conversations. During the project and afterwards they described feeling more confident and more able to discuss and join in the topics of conversation. For some this was a major achievement, and something they were very proud off. Others described how family members had noted a change in their knowledge and/or skills, remarking on this to the individual. Sometimes shared knowledge with family or showed others how to do things.

Those implementing had a need to do this – for their workplace but for some – it was when they had had a reason to also use in personal space, that add to the motivating force to overcome any barriers and actually make it work. And when it worked, it was self-reinforcing. In one group, student was more focused…

Those who were anxious, or who were a bit reluctant, tended to be more critical of the tools. The seemed to consider more of the ethical issues, or concerns that could arise in the use of the tools, rather than adopt the tool with enthusiasm.

Playfulness – playing with support – wanted help to play, not playing on their own
One gained confidence in her ability to sort stuff out for herself….

For some being in the group assisted them to better understand what it was they knew or didn’t know. They were able to compare themselves with others perhaps for the first time in a group situation? So sometimes rating of self increased – when they realised what they knew compared with others? (in Institution Four group was one person)

Appendix 12 – Institutional Case Studies

Case Study Institution One

Introduction

Ten participants started the project but two dropped out early and were replaced by two new participants. The two participants who dropped out cited time as the reason for leaving. The two replacements felt that their late inclusion had an effect both in terms of their 'catching up' and feeling part of the group, but still felt their involvement was worthwhile.

Of the ten who completed one was an academic, four were general staff, four were students and one was both staff and student. Only two of the ten were male. Most of the group were New Zealand European/Pakeha (seven), the remaining three being Indian, Chinese and German. Ages ranged from early twenties (one) to over 60 (three). Three were in their thirties and four in the forties.

A wide range of technical ability and confidence was evident in the group, from an IT manager to a student with very little experience or confidence in the use of computers. This range and diversity of abilities worked well in the group with everyone realizing at some point they had a contribution to make. All were regular users of the Internet, however, one person in the group had less than three years experience with computers. Most (70%) rated themselves as being of average ability in using electronic technology. Only one person considered themselves as below average and two as above average. All ten felt that to some degree they faced an increasing need to be more digitally competent.

The most commonly used tools were Internet search engines which were used on a weekly basis by 80% of the group. This was followed by library databases, online directories and wikis, used weekly by 40% of the group. The least used tools in were social bookmarks (never used by 80%), web feeds, file sharing, presentation sharing (never used by 70%), blogs, computer conferencing, photo-sharing (never used by 60%) and book sharing and social spaces (never used by 50%). The confidence levels showed a strongly inverse pattern to usage with people feeling most confident about search engines and library databases and least confident about web feeds, book sharing and computer conferencing.

Five of the group expressed anxiety and were uncomfortable with the thought of using unfamiliar technology. The other half of the group felt at ease about the process and were not worried about making mistakes. Nobody lacked confidence in searching websites, using email or using computer applications, but 70% lacked confidence in creating websites, 60% in using computer conferencing, e-portfolios and digital videos and 50% using discussion boards, online chat, and digital audio.

When learning to use new technology people were least confident if left on their own to learn followed by only having an instruction manual. Almost everyone was confident if there was someone on hand to help or they had plenty of time to learn.

Most (80%) said they would persist with a problem and spend extra time until it worked correctly and 60% had no doubts about their ability to solve problems they may encounter. About 70% thought they would need to ask for help. Most people (60%) also confessed to getting frustrated and annoyed when there was a lack of progress.

Workshops

The workshops had three distinct sections. Each one started with a verbal report from each participant on their progress during the week and their objectives for the coming week. This part become progressively longer as participants offered more feedback and suggestions to the reporter. Reporting also took longer as people took more and more pleasure in sharing their achievements and successes. It was also very common for them to express their relief at being able to share some of the problems and frustrations they had experienced. A phrase, coined by one of the participants, "there's always Friday" (the day of the workshop) was used weekly by at least one person. Whenever someone felt at their wits end during the week, they repeated this mantra to themselves knowing that someone in the group on Friday would be able and willing to help.

The next stage was for discussions. These mostly arose spontaneously from issues raised in the reports. Examples of discussions include: Safety and security online; the validity of online sources such as Wikipedia versus the peer-review process; the nature of truth and reality and using work time and computers to access social sites such as Facebook.

In the last part of the workshop people worked on their own projects or helped others. Often this would involve someone demonstrating a new tool, technique or piece of equipment to the group or part of the group.

Everyone in the group used a blog for their weekly reflections and while most people read the blogs of others, few comments were made here. Most communication between workshops was conducted using Google group email (almost 300 mails were sent over the course of the workshops).

DIL Categories

Recognition. Most of the participants had recognised a need to improve their DIL skills for some aspect of their work and so they came with at least some idea of what they wanted to achieve. For example Helen wanted to develop a forum for students with disabilities. Brenda wanted to improve her efficiency in managing information for research and teaching. John and Jenny started with clear objectives that changed little during the project. The others however, refined their objectives as a result of interacting with others in the couple of workshops. Their objectives ranged from the straight forward; learning to use particular applications such as Powerpoint and Endnote, through developing better search skills and social networking to podcasting and setting up a website. However, exposure to a range of tools and approaches hitherto unknown, unleashed a much expanded recognition of not just what was necessary but what was possible.

Through the interaction in the workshops people were introduced to tools and approaches that they had not considered. For example Fiona found that Blogs and Skype were able to solve the problem of staying in touch with friends and family when she was overseas. She hadn't considered a digital solution. Vera's first recognition 'lightbulb' occurred when she was introduced to a memory stick (she had intended to burn her powerpoint presentation to a disk). From this she rapidly progressed to recognising the benefits of more powerful and newer technology and during the course of the project upgraded her home computer, bought a new laptop to augment the home computer, bought a 22 inch monitor and several other pieces of equipment. John found that Del.icio.us.com solved the problem of keeping resources in a central location accessible from any locality. Many of these 'recognitions' were not part of the participants original objectives because they hadn't realised their specific problems had digital solutions. These recognitions were incidental in that they weren't being looked for; they occurred because of relatively random connections, thus the quality and intensity of interactions between participants would seem to be directly related to incidental recognition.

Access. Access was an issue discussed by participants on several occasions. Accessibility has several potential obstacles. The first is having the necessary knowledge and skills. Jargon or terminology was an initial barrier for most of the participants. Maria described how it made her feel like she was in a 'foreign land' where she didn't speak the language. While not understanding specific words stops a person progressing in an action, it is always possible to look them up online. However, the proliferation of jargon can become too daunting. If you have to look up the meaning of too many words the whole exercise becomes fruitless and giving up is easier. As the participants progressively mastered the jargon, they became more comfortable and confident working online.

Having the right skills or 'knowing the ropes' is also important. For example, many websites require you to set up an account or register before you can log into a website. The login error message does not usually alert you to the need to the need to register and will simply tell you the login name or password is invalid. Most participants reported frustration at getting caught in this trap. Interestingly some of the participants were able to help their adolescent children with this particular problem – much to their satisfaction. It is sometimes these small problems and inconsistencies between websites or tools that cause the most discouragement. People are often more willing to invest time in solving big issues.

IT experts also proved to be obstacles to access for at least three of the participants. These were people whose partners and/or sons were very technically proficient and, in the guise of 'helping' actively discouraged their family member from doing things themselves because they were considered too incompetent or impatient. This attitude reinforced the participants' beliefs about their ineptitude and denied them the opportunity to develop these important skills.

Equipment and broadband as access issues were also raised by Rita and Vera in particular, though others agreed with their sentiments. Rita did not have broadband at home and her computer was relatively old with older software on it. After learning new skills or about new tools at the workshops she would race home to consolidate her new knowledge. However, she was repeatedly frustrated by the limitations of her home computer. Even the University computer labs used for the workshops had a number of restrictions that impacted on what could be achieved in the workshops – for example audio was not possible. Vera who was a mature student with only a couple of years exposure to computers rapidly became aware of what she could achieve with the very best equipment. She was in a position to buy what she wanted but she was very conscious that many people could not and she was concerned about the potential of the digital divide if large groups of the population did not have good access to digital solutions.

Evaluation. All participants engaged in evaluation at some stage because they all considered alternative solutions. Evaluations related to how well a particular solution fitted the needs of the participant. Most people did not consciously think or specify criteria in relation to their objectives but did mention criteria as a reason for preferring one solution over another. For example, Andrew selected itunes over others because he regarded it as more versatile and offering a wide range of interesting tools. Maria and Jenny both determined that a paid website was better for long term sites such as business ventures because they were more stable and not spoilt with adverts. However, there was no evidence that participants consciously evaluated the relative reliabilities of different sources of information.

Participants did, however, discuss at length the reliability of information available on the net. Wikipedia for example was severely criticised by the academically inclined in the group as for not going through the rigorous peer evaluation used for research publications. The counter argument was that facilities such as Wikipedia increased access to information and knowledge for a greater number

of people and ‘peer-review’ did occur by the community of users who evaluated and modified online content.

Management. Management of information was particularly important for three participants: Brenda, Helen and John. For Brenda and John it was work related. John collected resources that had the potential to be useful for his Ph D but he wasn’t always able to consider them at the time of discovering them. He needed to store these resources until he was ready to evaluate them. Additionally, he needed to be able to store the resources in a manner that allowed him to quickly identify, access and cross reference related information. Del.icio.us provided this solution for him. Likewise Brenda accumulated resources for both research and teaching and wanted to be able to organise and access them readily. For her, Onenote and Endnote provided the solutions she was looking for. Whereas Brenda and John were solving work problems Helen was looking for a way to accommodate her interest in keeping up with various websites and blogs that covered a wide range of issues, mostly non-work related. For her the solution was setting up feeds so that the information was sitting waiting for her when she had time.

Application. Application was clearly the most important activity and consumed most of people’s time. For John, Brenda and Helen applications that enabled them to manage information and improve its accessibility was important. Most of the other applications focused on communicating information in some way. Fiona, Jenny, Maria and John wanted to stay in touch with friends and family in different parts of the world. For Fiona blogs and Skype achieved this. For Jenny, John and Maria (the youngest members of the group) the solution they decided, after trialling several, was to set up a website. Social networking tools were considered but privacy was an issue and a self-developed website offered more security. Helen and Rita wanted to create an online forum for specific groups of vulnerable students they were responsible for. They wanted the environment to be easily accessible and ‘comfortable’ for the users. For Rita Facebook worked as it was already being used by many of her young students. For Helen Google groups was a better answer because it was easy to set up and access was invitation only. Vera, a student, needed to be able to present a seminar to her class. Powerpoint was an easy decision because it allowed a sophisticated multi-media presentation that was relatively easy to learn. In using this Vera also learnt a lot about appropriate ways to present information for maximum effect. She scoured the Internet for useful graphics, quotes and ideas.

Ethics and Issues.
Safety and security issues featured strongly in the workshops after Fiona saw the photo and personal details that Maria, a young female, had put up on her blog. The discussion that followed on the dangers of the Internet increased everyone’s awareness and sensitivity to this problem. Most people in the group spent time researching the problems and looking for solutions. As new ideas were discovered they were raised at the workshops. By the end of the workshops people felt they were better equipped to protect themselves but also recognised that there were still dangers that needed vigilance and awareness.

Participant Capabilities

Confidence. Some generalisations can be made regarding the level of confidence participants started with. Males were more confident than females, and younger participants were more confident than older ones. Additionally, the least confident had the least experience. Six participants rated themselves as low to very low in confidence. The four who had overall higher levels of confidence expressed less confidence in those areas that were new to them.

Those who were low in confidence seemed to underestimate their knowledge regarding technical issues and their ability to learn to use new technology. They have an expectation of failure and frustration. Some of this came from past experiences and some from being told by more technology proficient people that they were no good with computers. A number of those with low confidence also described a fear of being embarrassed in front of others. Low confident participants also frequently expressed anxiety about learning to use technology and making mistakes. They expected it to be difficult.

These generally low levels of confidence began to rise with the first workshop. However, for most the journey was not a continuous upward swing, rather it oscillated quite strongly between confidence and anxiety. Progressively the confidence gained ground, but the anxiety, particularly about learning new things, may never completely go away for some.
Everybody reported gains in confidence but the biggest gains were made by those with the lowest confidence.

Persistence. Most participants described themselves as persistent, particularly about anything that was important. Participants also said that in general they were more likely to be persistent about a work-based technology issue than a home-based one. All participants demonstrated persistence in working towards their objectives, sometimes having to overcome significant or recurring problems. For example, Jenny persisted for two weeks to try to get web-building software to work. It involved diagnosing problems and tracking down solutions online. As one problem was solved another appeared. Vera had numerous problems with compatibility when buying new equipment. Despite her low level of technical knowledge she looked online for help, visited several computers stores to ask for advice and talked to the group, especially Andrew, to get the information she needed.

Risk Taking. Risk taking is a relative concept. It has less to do with the absolute level of risk and more to do with the distance between a person's ability or knowledge and the target behaviour. Consequently, those with the least experience and confidence often were the biggest risk takers. So Vera, who had to be persuaded not to pull out after the first workshop, started with a memory stick and progressively bought more and more expensive equipment. She identified and bought individual components that she then had to connect so that they would work together. An easier option would have been to buy a complete system recommended by the store. Within minutes of hearing about Wikipedia for the first time, Rita had registered and made a contribution to it. Brenda went from refusing to even try Onenote to totally re-organising her work and her home administration using it. John, Jenny, Maria and Andrew, all higher in confidence, also tried new things, but where much more in their comfort zone.

Seeker. All participants engaged in seeking information, it's an inherent part of any learning experience. What was interesting about this group was the wide range of sources they were prepared to seek help from. Most came to the workshop with the expectation that the facilitator would take the normal 'teacher' role and found it perplexing when this didn't happen. They were forced to find alternative sources. Other members of the group were an important source of information and clearly people felt comfortable asking others in the group for help. This happened in the workshops but also asking for help became the main function of the group emails when people were working on the DIL project during the week. Participants also felt progressively more confident about finding answers online. Several commented on the usefulness of being able to type a question into Google and make contact with people and/or solutions that had already been found. With greater confidence participants also found information in the news media that they would not have paid attention to before. They were also more willing to engage in casual conversations in social contexts regarding IT issues and learnt new things this way. Many younger participants also used their friends for advice and information.

Motivated. Despite the low levels of confidence in some participants, all were highly motivated. Most initially stated that they were motivated to improve work efficiency, however exposure to a wider variety of tools and approaches stimulated their motivation to use technology in their home and personal lives. Rather than creating a conflict, these two different motivators cross fertilised and lead to generally higher levels of motivation. This is interesting because all participants had used some technology in their work or study, mostly online library databases, online directories, search engines and email, and yet this did not seem to have a large spin off in developing confidence or motivation to learn new technology. Perhaps this may have been because these skills were learnt in formal training programmes, whereas the workshops focused on independent and collaborative learning which led to the participants learning more about their own learning, Perhaps, people become more motivated and confident to try new things when they are confident about their ability to learn.

Sharing. Willingness to share was a defining characteristic of this group. Within a few minutes of the first workshop starting a group dynamic took hold that established the climate for the rest of the project. It seemed to be initiated by the older women in the group who openly asked about terminology and concepts that were new to them. Their questions were mostly answered by others in the group rather than the facilitator. So very early it was established that it was okay to ask questions and 'not knowing' was not something to be embarrassed about. The answers which came from the more experienced where given in a spirit of sharing. The interaction was beneficial to both parties and generated a lot of good feeling. These interactions continued between workshops via email. The climate was one of trust and openness, creating a very safe learning environment. Participants commented frequently on the importance of this to the quality of their learning experience.

Inquiry. Taking part in the project was a voluntary activity that required considerable effort and commitment from the participants, therefore it is reasonable to assume that the participants all started with an eagerness to learn. What is interesting, and perhaps highlights this love of learning is the fact that all participants learnt much more than their original objectives. As they recognised the value of new information they were very willing to expend time learning more. Often this involved time exploring a tool before its usefulness became apparent. Of the ten workshops it was only compulsory to attend 5. However, there was very little absenteeism. Some people attended all ten sessions, most people missed only one or two sessions and then always because it was unavoidable.

Reflective. Males and younger members were the least reflective. These participants tended to focus on the describing activities they had engaged in and information they had discovered. They said much less about how they felt about their experiences, the insights they gained by reflecting on their experiences or how they were influenced to future action them. The older women however, were very reflective and wrote at length about their personal response to their new experiences. Their blogs and other reflective material is rich in information on how they used their new insights to manage further learning. For example Brenda who was inclined to get very impatient with new technology and avoid it, reflected how her students must feel the same way at times, and she decided that if they could persist then she would too. She used this recognition of her students' persistence through frustration to keep herself on track. She also vowed to keep remembering this feeling when she was teaching. These women made the greatest gains in both skills and confidence though whether this is due to gender, age or experience, or some combination, is not clear.

Immersion. All participants used computers on a daily basis as part of their work or study. However, it was clear that in addition to the time spent in the workshops, considerable time was spent engaged in additional exploring and practice of new technology between sessions. This was apparent in the emails and the weekly reports. There were also a number of reports of participants staying up to the wee hours of the morning, much to the annoyance of spouses! However, most participants felt they

had not put as much effort into their between session activities as they would like to or felt that they should.

Problem-solving. At the start of the project a number of participants felt that having an IT specialist on hand was essential as they had little confidence in their ability to solve technical issues. However, as their knowledge grew, particularly in the area of jargon, they became more willing to attempt to solve problems. Several experienced not one problem but a series of problems for example Maria with her badly virus infected computer, Jenny with difficulties in getting website software running and Vera with hardware compatibilities. These people learnt to tackle one issue at a time and had some, if not always complete, success. All participants still liked having an expert on hand but by the end of the project they had developed a number of strategies for dealing with problems and felt they would only refer to an expert as a last resort.

Technical. As described earlier the range of technical proficiency at the start of the project went from very little to very much. While all participants made gains it is clear that relative to the starting point the least proficient made the greatest gains. Most people came to improve their work-related skills but they also made considerable, and unexpected, gains in the area of communication tools. Many of these were of more relevance to social activities but there were also clear spin-offs into work areas, for example in terms of expanding the range and quality of contacts.

Conclusion

The group at Institution One became a very tight-knit, supportive unit. Whilst having diverse personal objectives and experience, they found enough commonality to profitably engage with each other in meaningful and relevant ways to enhance learning. The success of this collaborative effort would seem to come from five factors. First, the participants set their own learning objectives and these had personal relevance to them. Consequently they are more likely to be committed to pursuing them. In most formal learning situations the teacher determines the objectives and students are meant to passively accept them. Such objectives are likely to have less, if any, relevance to students. Secondly, they engaged in genuine collaboration. The participants were not competing for grades, as they would be in a normal class. The size of the group was small so they were able to get to know each other quite quickly. Help was reciprocated; everyone found they had something to contribute. There was a great deal of trust between participants which fostered a safe environment. A third factor was the focus on learning rather than assessment. Having assessment as compulsory ‘pass’ points in a course distorts learning to focus on what’s needed to pass each piece of assessment rather than what is important for learning. Using a workshop approach rather than seminar ensured that participants actively engaged in learning, and finally the group took ownership of the process from the first session. They decided what the issues where and took responsibility for helping each other.

Case Study Institution Two

Introduction

There were 12 participants n the MIT group. One did not complete, leaving after attending only three sessions. Of the rest, the majority attended most of the sessions, with only three attending less than 50% of the time. All completed the pres and post survey, and attended the focus group at the end.

Of the 11 who completed, three were students, with one of those working part time for the institute, two were librarians, the rest were academic staff. Three were Tangata whenua (all male). The student who left the programme was Pasifika. The rest were European female.

The group all began together (except for the student/staff member who joined after week four). They were given the option of attending fortnightly only but all decided to come to the voluntary sessions as well as the compulsory ones, which would have made a total of 12 all together, if they attended all sessions.

A wide range of technical expertise was evident, and participants in this group generally began with a fairly high state of confidence, even with aspects that they had not used. They were most confident with the familiar - Internet searching, library databases – but assumed the less familiar tools could be mastered fairly easily. Very few had used any social networking – nobody had kept a blog when they started the project, most had not used digital audio or video – the students being the exception here. Few confessed to being prone to giving up easily, but did admit a degree of frustration and being out of their depth, or afraid to click too far.

The librarians were comfortable with online databases and searching, the students not so much. Few had used any web2.0 tools – the institute blocks such use in the main from on-campus. Only one staff member had a Facebook page. All claimed to be regular users of the Internet however.

Quotes

Thoughts - How computer literate am I really? Comfortable in current space, can bluff some others, but also am often completely bewildered.

Fumble though quite a lot.

… bit apprehensive as to how far I keep clicking (what things mean) and time factor...

The face to face sessions were valued more than any virtual communication - although all set up a blog, they did not visit each others much and rarely used email to communicate or support each other between sessions. All participated in the topic of the session, and in all the activities suggested, often adding the gadget or technique to the list of goals - switching paths, flitting from topic to topic. Some widened their goals as a result, but all achieved their goals, whether it was to set up a blog, make a video, enhance their search skills, give better feedback to students based on the digital capture of their actual performance, master the LMS.

Few actually consciously constructed a personal online learning environment – some used Delicious, three bloggers (one staff, two students) really got going – but the rest preferred the face to face learning environment. The student participants took a more methodical approach and worked through a number of technologies and DIL aspects on their own – accessed the OIL modules, working methodically through them, doing the little exercises, practising their skills, sharing their insights with other students both in the class sessions and out. However exposure to the topics of the sessions and what others were doing did encourage some to see things anew – revisit the library and really note what was available, see how for the first time they could use the aspect in their teaching.

Workshops

The workshops were conducted in three sections. They began with a round of where people were at with achieving their stated goals, and what they had discovered or played with over the week in between. (Although scheduled to be fortnightly, most tried to attend weekly.). Next there was a topic of the week where a requested aspect of DIL was introduced – Smartboard, digital video, digital audio, social bookmarking, blogging etc. Finally time was given for participants to work together or singly on their own topic/project of choice.

Most participants valued the face to face nature of the workshops as an aid to their learning. They made little use of the blogs, email or other virtual social constructive approaches. They were happy to participate and share while in the session, students taught teachers several aspects – the group learned well from each other. They were prepared to take risks with others, in the presence of others. They tried things after being shown them and helped each other to come to grips with them. A great deal of sharing happened in the sessions– sharing what they had done in the time between, sharing of expertise with the topic of the day, sharing blog set up skills, sharing video making skills particularly. Their understandings were more likely to be shared with the group verbally than on their blogs

Quotes

I've learnt through those sort of rounds up at the beginning were beneficial – that's how I've learnt – give us a little bit of support. .. Being with the group was a "capture of learning - **sharing**

But what I found here was that being here was a capsule of learning for myself and it was actually good. Not teaching, you're sitting here and someone else teaching you. There was information and I learned a lot and the knowledge base D has and that. People and quality relationships just makes you realise what it means to step up to that.

Good discussion at group tonight. Enjoy the sharing of ideas and how everyone is using/exploring this digital technology.

I missed session five, and quickly realised how helpful it's been to have some dedicated time to work on blog postings, investigate technologies and tools, and check on what others in the project are doing.

Aspects of DIL which were important to participants

Recognition, most of the participants had joined the project recognising they had skill gaps and saw this as a way to update themselves. As the project progressed they were exposed to a range of tools and approaches they had not realised were available. A good deal of time was spent on digital video as a tool, as the students had expertise and the staff wanted to make use of it in their teaching. The students focussed on the OIL modules and search techniques, sometimes assisted by the librarians in the group. However a key recognition was that their skills were not as prevalent as they had first thought – most reduced their judgement of the level of expertise they had and the number of tools they were using – possibly because now they knew they did not know what they were or had not really used them at all.

They all felt they knew a lot more than when they arrived but felt it was just the entrée – there was a banquet out there that they had not even been aware of. They are all though willing to continue giving it a go, to forge on with confidence to use info lit in their teaching and learning. They now know what they don't know. And the teachers suspect their students know far more still.

Access

Most were familiar with library databases and the like, but unsure about other methods of accessing digital material – beyond search engines. A few had used Skype, but from home only.

Most participants encountered technological barriers – lack of access to social networking sites, YouTube, etc. This was lessened by the use of a dedicated suite for the workshops where access was less restricted but any skills or exploration other than that had to be carried out away from the institution itself, for both staff and students. Time for exploration was an issue. Many appreciated the dedicated hours of the workshops as a slot where they could take the opportunity to explore.

They also felt access was an issue in that the terminology was overwhelming and if you didn't know the language you couldn't communicate – with the site or with others who did know the language.

Evaluation was therefore an important aspect. Mostly they evaluated against their own criteria – usefulness for their purposes. A student particularly discovered that by using a blog, he could store "stuff" somewhere other than on the limited file storage space he was allocated by the institute and used it for drafts as well as finished articles. Others evaluated tools that could be applied to a problem and rejected them in succession when they were not quite right for the purpose. One student, having used an OIL module to learn how to refine her search, moved on the one about evaluating results, with alacrity.

Management of information was less important to this group. Their access to social bookmarking on campus was restricted so DeLicious could only be used from home to organise bookmarks. One of the students made use of his blog to store materials – which he found an advantage. No one experimented with RSS feeds or other information managing processes. The use of directories on their logins was well understood however and used for filing found information in the main. Access to these files is permitted from off campus, but few in the group knew how to do that.

Application was important for the group. All the participants wanted to make use of their DIL skills in their teaching or learning. They tended to be users of information more than creators, and although video artefacts were important, they were to be used for feedback or for assessment purposes in the main. The uses of the LMS were a goal for one participant, how she could improve her teaching and assessment methods and the students applied their new search skills to assignments. One student was particularly interested in sharing his digital audio skills with his iwi n Northland, once he had figured out the logistics of radio broadcasting.

Ethics/issues were discussed more than once by the group. Many expressed surprise at the information which was shared on places like Facebook and other social networking sites and how that kind of interaction would impact on their relationships with their students (and their teachers). The librarians lead a session on copyright which was a topic much debated. All felt they had a better understanding of the guidelines by the end.

The use of blogs for assessment purposes was also discussed, where student coursework was open to the public. The use of video data – for assessment purposes- was also considered, particularly in the early childhood sector, where permission would need to be sought from parents to film the interactions that would be used for feedback to the students on placements. By the end of the project, all felt they had a better grasp of the dangers on the Internet with regard to sharing of information and personal details, and of protecting themselves from some of the dangers they were now aware of.

Participant capabilities

Confidence. In all cases confidence improved, but often their reported confidence dropped by the end, because they now were more aware of what they did not know, had not really tried. But to balance that they were more confident in their ability to tackle different technologies and while they anticipated problems, were willing to persevere to solve them, either on their own or with assistance. Most claimed to be **persistent**, and reported a drop in the need to ask for assistance early on, and were prepared to keep plugging away on their own, no longer afraid of making mistakes. Persistence therefore had improved across the board and the degree of self direction increased.

Quotes

My expectations of being able to use any digital information methods and tools is now extremely high. I have confidence in my own abilities".

Definitely feel more knowledgeable, confident.

I don't care if I don't know now cos I can go out and find out. That's my attitude, whereas before I was a bit hesitant. I feel less concerned about making mistakes.

Having an awareness now will just lead you into the future with it won't it , just knowing.

Problem solving. The participants made good use of the team involved in the facilitation of the sessions to solve problems they encountered. They also drew on the strengths of the group, helping each other out during the sessions and demonstrating aspects – particularly video and blogging. One pair worked together regularly as the teacher had not recorded passwords or the steps involved in setting up his blog so was taken through it methodically by a student.

Many reported that they were now more confident in making a start on solving problems for themselves, before calling for assistance, and now felt they could at least articulate the issue more clearly to the IT support or their family , now that they had a bit of the jargon. When one solution they experimented with did not fit the bill, one participant was willing to try another approach with confidence that she could make it work for her instead.

Inquiry. The students particularly approached the OIL modules with a method of systematic inquiry. They worked their way through the topics, often exclaiming how picking up a skill or approach was making such a difference. One student spent time on all modules, evaluating the products or approaches against his own set of criteria – usefulness to him and his fellows. The staff member who was looking for a video solution progressed through several stages of evaluation of he solutions that were suggested, until she found one that suited her purposes.

Creativity. This occurred mainly with blogs – adding visual material – and with digital video and sound file creation and manipulation. Here the students excelled and caught the staff up in their enthusiasm. A teacher had purchased a digital camera and was experimenting with it. Another teacher tried a digital photo frame, then an eepc to display captured footage for feedback purposes, while another teacher inspired the group to look more closely at their PowerPoints, reducing the words and basing the presentation n images. She had experimented with this as a method of gaining back flexibility in her teaching presentations, as she felt PowerPoint constrained her too much. Another teacher discovered the features of the LMS and enhanced her teaching by usig it more creatively.

Motivation. About half the group had clear goals when they arrived, others put some on paper when prompted, but nearly all moved far beyond what they set out to do. Motivation was high and they generally got caught up in what others were doing or started off in another direction when the topic of the session was introduced, **(engagement).** The staff member who wanted a video solution was focussed on that however, as was the one who wanted to learn more about the LMS. Others flitted from topic to topic but achieved their original goal as well in the end.

They were all prepared to **take risks** when in the company of the group, experimenting with new gadgets and online resources. The weekly session was a safe environment for them to admit ignorance, or amazement, and indulge their **curiosity** as the environment had fewer restrictions on access than they had on their usual work or student computers. They were willing to explore the possibilities and take instruction in working new gadgets and pieces of software. There was a particularly enjoyable session around smartboards and again with digital audio.

Interaction was high in the group. As reported above, assistance was sought and accepted and a lot of sharing went on in the sessions, fostered by the initial round done at each workshop. It was quickly established that there was no such thing as a dumb question - all admitted ignorance and a desire to learn. A spirit of genuine collaboration was established; help was reciprocated.

Participants also reported sharing outside the group – with family or fellow students. The group even expressed a desire to continue meeting after the project finished – and arranged a reunion a month later as well.

Virtual interaction was more limited. Even when encouraged to comment on each other's blogs, little activity ensued and the interaction remained in the face to face environment.

A number of the participants were planning on sharing their new expertise/confidence with others – either with their fellow students, their own students or family members. Two commented that their new vocabulary enabled them to discuss DIL topics with others – the younger generation, IT support staff – and interact in a more informed and technical manner.

Reflection was prompted by the action research cycles and blogs. Two female staff were already well versed in the art of reflection – blogging came naturally to them and they willingly shared their thoughts, knowledge gains and feelings about their experiences. The two tangata whenua males also made a good fist of their blogs, revealing a great deal about their feelings and how DIL would affect their futures, both in work and personal environments. The other student was not so enthusiastic and blogged very little. A librarian explored a joint blog for gaining feedback from students, while her own was really an experiment in the environment rather than a personal journal approach.

Most of the reflection happened in the sharing sessions, verbally. The final focus group session yielded rich material about their progress and their thoughts on the future.

Quotes

I think myself if I use a Maori metaphor, call it te kako – which is the seed so this to me is like a seed it fell to the ground into my thinking and it's for me to nurture it and nourish it and it's called the waitanga - to make it grow so the small beginnings have great endings when I look at it due to the amount of time that we started here, I think it's just like an entrée and we go on to the bigger meal

The thing about this particular project that's been useful for me we have come together as a community of learners, a community of practice And I'll miss it when its not here,

The students particularly reflected that this experience had given them power – to share with others, to advance their communities, to advance their dreams. The TW teacher saw the benefit of DIL for his teaching and the community it served. (Quote: As with working in a new field the ability to reflect and review is essential for the purpose of social workers and counsellors in this approach.)

Technical aptitude. The participants in the project came in with a wide range of expertise from very little, to expert in small areas which the group managed to draw on over the period. Most came to improve in areas that related to their work or study, but picked up skills that could be applied in their private lives as well, with family and friends.

One of the bonuses was the vocabulary knowledge base which was expanded for all, giving them the ability to ask more confidently for assistance from the groups that they had before avoided in fear of appearing too ignorant. Another was their perception that having mastered the basics they could now confidently build on that unaided.

Quotes

Learning the basics and its foundation for further activity to do with literacy and that leads you onto discovering more things about whatever tools like blogging or whatever you've understood

It will certainly be something to build on now because you are growing with it….I just feel like I've only just started touched the edges and I'm looking forward to trialling lots of different things that I'm still rattling around in my head and I'm thinking about.

I liked what you said T about it being a taster – I think it was a little appetiser and now we all want the main meal, we want more"

Beliefs. All participants believed that having DIL skills enhanced their professional competence. They considered their time had been well spent and were intending to continue as they felt the digital environment had much to offer them professionally and personally.

Quotes

TW Shift most certainly happens! And yes, I would like to be a part of this shift. And yes, I will be asking my principle and elected representative about what changes should be made so all our children, parent, civilian, public can benefit from this digital technology.

Their confidence had improved, as had their belief in their own abilities to operate in a digital environment, across the board. By the end of the project they felt comfortable in admitting what they did not know and asking for help as they realised there was so much to know that they couldn't possibly be expected to have a grasp of everything. So it was OK to ask. They had shard their pleasure in learning about the possibilities and their delight in discovering new tools and felt that continuing to explore would add value to their teaching, their study and their lives.

Case Study Institution Three

Introduction

There were 11 participants in the OP group. One of these did not complete. This mature student who rated herself at the lowest level in terms of her digital skills, and could not logon to the network in the first session, attended three workshops, but then did not respond to further contact attempts by the facilitator. The student did receive guidance with essay writing including aspects such as a simple way of inserting macrons for Māori words and the use of help to solve formatting problems. She may have had her immediate needs met.

Of the ten who completed three were students, six were both staff and students and one was a staff member only.

The group all commenced at the same time and attended “compulsory “ workshops alternating with optional workshops. While attendance at the workshops was appreciated by most, at least one found it a distraction and thought that contributing to others prevented her from achieving her own goals. Six people was the usual number attending the workshops, but absences were often for legitimate reasons; clashes with work arrangements, previously planned trips. Being required to provide written goals and fit their actions to the Action Research framework was commented on in a negative way by two of the participants, although they to some extent appreciated why this was being asked of them.

One of the ten full participants rated herself initially at “very low” in terms of her digital skills and as “unconfident”. Four participants considered their skills to be “average”, two rated their skills as “high” and three as “very high”. These ratings were, in almost all instances matched by their levels of confidence, making this group overall, one which had considerable experience in the digital field. Five of them were already undertaking related work, and/or study. Nevertheless, when the workshops commenced it was found that for most their experience of Web 2.0 tools was quite limited. Questions aplenty were asked. Finding out about tools, new to most, dominated the workshops and exploration, loosely associated with their goals dominated their practice. They learned from each other and from the facilitators, but goals, while giving some direction, were not in general fully attained during the duration of the project. However, they did all produce clear evidence of new learning and some were ready to apply these skills when relevant.

The group was strongly encouraged to use blogs to record their reflections, share their experiences, and to respond to each other. To facilitate easy group communication these blogs were listed in their section of Wikieducator. The reflections have provided many insights into the participants’ thinking, their learning and the activities they engaged in. They have formed the core of the case studies. Two group members were quite reluctant to do this, but did so. Their follow up responses indicate they would be unlikely to continue with blogging. One group member was an enthusiastic and experienced blogger who was widely read by others within and beyond the group. For another group member, RSS feeds were very important and this gave her access to a community of people with specialised common interests. Issues of privacy, online identity and how to keep track of usernames and pass words were of concern for a few. The group participated in an Elluminate conference and spoke with a Wikieducator expert thus gaining enhanced appreciation of the potential for online education.

Aspects of DIL which were important to participants

Recognition, in the context of this project usually related to becoming aware of the potential of Web 2.0 tools which they did not know about, or were unfamiliar with. For some there was a strong focus on exploring new tools and sometimes this was the driver, rather than the purpose they wanted to achieve. For one particpant it was discovering that PowerPoint could become a repository for her

collection of material which guided her subsequent actions. Recognising the potential value of being able to use the Linux operating system on her inexpensive laptop was a starting point for one participant. Countering the focus on tools was recognition that systems were needed to manage, and store the large amount of information that was now accessible and also concern about the amount of time that could be spent delving into new possibilities, which may or may not have value for the person at that time.

Access to new information sources and tools was an important part of the project for most participants and of some value to all. Associated with access, for some, there was frustration related to the need to have different usernames and passwords and subsequent difficulties with re-entering sites. For four participants their goals required them to devise appropriate ways of making resources, they created, or collated available for others to access. In one case this resulted in a shift from the institutional setup of the Blackboard learning management system to exploration of open source options. Another opted for using an existing Google group and making material available via Google Documents. Wikieducator was also an option considered, but rejected by one participant.

Evaluation for this group, was linked with a large amount of exploration. The enthusiastic trying out of new tools, while always involving some critique, in some cases did not demonstrate depth, because of the range of possibilities dabbled with and the lack of a strong purpose for the “play”. At another level it was sometimes not a hands on experience. Participants listened to others and viewed what they were doing, without actually engaging with the tools, and made decisions about whether to try it in the future.

Evaluation of online information sources was done in accord with specialist needs of those in teaching, or dissemination of information roles, while one participant who sought online support for her development as a Linux user had to sift through responses to find those she could understand and which did not exceed her technical knowledge and vocabulary.

One participant viewed filtering and evaluation as major issues for young people who may not have the benefit of strong traditional knowledge frameworks to guide them. She saw reality and fantasy as all being jumbled up online.

Management of information and strategies for enabling efficient use of information and tools were aspects commented on by most participants. One advanced group member discussed her personal learning environment (PLE) and the way it brought together, and to some extent merged (like spreading biscuits on a tray), her various tools and sources. Her blog, established before the project was very important and featured links to other aspects of her PLE. Others resorted to on or off line records of processes which they needed to recall and to usernames and passwords. Setting up Google reader, or similar, was chosen by some to manage automated access to RSS feeds and some adopted the wider organisation of iGoogle as a hub for their developing array of online connections and interests.

Specific aspects considered by participants included managing photo storage on the Internet, considering what to do to stop being lost and overwhelmed by large lists of “favourites”, and managing circulation of material within groups.

Application was a strong focus for this group. Presentation of material for others was the most common goal. Their efforts ranged through wanting to share examples of textile art, compiling libraries of links, and learning how to use an interactive whiteboard, to creating ‘videos’, actual, or based on stills or screen shots, for educational purposes. The development of e-portfolios was also a

focus for one group member and of interest to others. One participant followed his interest in 3D modelling.

All group members created their own blogs. This was new to most. After the initial setting up they soon moved on to inserting images. At least two took this further as they wanted to insert video and audio files. As well as using the blogs to record their project reflections and to link to examples of their activities, they were also interested in the potential of blogs for ongoing use and especially for educational purposes. One was also teaching about blogs so saw this as a way to prepare herself for learners' questions.

An off shoot of their blog work was finding out about online image libraries, Creative Commons licences and copyright. For those unfamiliar with sites such as Flickr this opened up new possibilities to legitimately access and use online material. YouTube was used to provide content and also instructional material to support their explorations.

While all participants were aware of online communication possibilities, they mainly preferred their face to face interactions, except in two instances where they were already functioning in online communities prior to the project. One of these people said it had taken about a year of real effort to establish her online presence and to use her PLE effectively, but it was still expanding during the project with her move onto Twitter.

This group stopped short of producing fully developed resources although this was the intention of many. Instead they tended to gain the skills, know about the possibilities and feel that they would be prepared to take it further, or add the real content when it was relevant. This seemed to reflect their reasons for joining the project which were sometimes stated as a general desire to increase their levels of digital literacy.

The person learning about Linux took this to the stage where she could successfully use her computer for ordinary functions.

Ethics and issues often were discussed within the group. Sometimes this occurred in the whole group situation and was sparked by facilitator introduced material, or other times it arose informally as group members questioned the consequences of actions they were about to take such as setting up blogs. Two people were very cautious and thoughtful in their approaches to new tools. A third person undertook research to attempt to understand the various aspects of intellectual property in an online environment. This was partially associated with her work which involved resource development. One participant wrote extensively on her blog after a session which discussed several issues. These were summarised under the headings, privacy, time and open access.

Some people were health professionals and it was mentioned that some institutions were trying to prevent those in their field from engaging in online interactions with fellow professionals, or students, or requiring them to assume pseudonyms and not identify their institution. The main blogger in this group was opposed to this and favoured openness, while recognising that great care had to be taken not to breach other people's privacy.

Three people expressed major concerns about the amount of time involved in online interactions and exploration and how this was not necessarily a good use of time. At least one person was very relieved to find that it was OK to consider this as part of her work and that she did not need to come in out of work hours do engage in project related activities. This perceived waste of time was also linked to isolated developments within the institution. It was felt they could be co-ordinated, with knowledge

and strategies being shared more, thus fostering more effective development of digital learning and teaching possibilities.

Participant Capabilities

Examination of these capabilities is associated with observed or self reported change during the project.

In terms of self efficacy, **confidence** is an important aspect which is measured in the pre and post survey results reported elsewhere. As mentioned earlier most of the participants rated their confidence at least as average at the beginning and there were only two changes in their overall ratings in the post survey, one of these was a small lift from the lowest level, the other a lift from the first to fourth level, but this is inconsistent with other indicators of confidence and the initial choice of the lowest level was probably a mistake. However, with reference to specific tools there were many instances where confidence and usage increased during the project. Three people, those with less confidence than others, did note that they became even more aware of their inadequacies after the first session, where they heard people discussing things they knew nothing about and they realised how little they did know compared with some of the others. However, this was soon left behind as they realised that they could use the new tools too.

Persistence was not always aligned with confidence and two people wrote about their contradictory attitudes which in some instances meant they persisted for long periods of time and other times gave up easily. While many gained confidence in relation to new tools they encountered, they still appreciated being able to seek help, face to face, with only two getting significant help from online sources.

Levels of confidence were also associated with matters other than technical skills. Even one of the very confident, experienced Web 2.0 users acknowledged that she used feeds and read blogs but usually didn't share her own thoughts although she had a blog before the project began. Another spoke of taking extra time, as she realised the public nature of a blog, while three were quite concerned about putting themselves out there at all, although all did so.

A further aspect of confidence was the need to perform in front of a class, which required extra practice and prediction of potential problems. This was a concern for one participant, increased by the limited availability of an interactive whiteboard for practice.

Independent **problem solving** increased as participants engaged in more and more exploration. But even more experienced people liked to be able to ask someone what to do. There was a large measure of appreciation for the group setting which meant that there was usually someone who could support people in trying to solve their problems. Because people were encouraged to set goals related to their work or study, they usually needed to evaluate a number of possibilities and make choices about what suited their needs, rather than just learn how to use a new tool. This meant problem solving was occurring often, but it was sometimes diverted by the curiosity about new tools which may not have had relevance.

Several participants realised, or were encouraged, to systematically approach their problems. These people recorded (sometimes off computer) new vocabulary and detailed instructions to enable them to return to it later. Being able to articulate their questions was appreciated as a way of getting help, whether it was on or off line. Youtube videos were a source of support for at least two participants, but they did not necessarily provide the answers. The person setting up a Linux system on her computer, used an online forum for support. At first the language used made it seem beyond her reach but after

an intensive face to face session, she was able to select online guidance to suit her needs and to successfully use her computer.

One very persistent problem solver, seemed to create new problems as she solved others and appeared to be always dealing with lots of complexity, although apparently having a systematic approach and being willing to ask for help. This seemed to be exacerbated by encouragement to seek open source solutions which she then found had constraints of various sorts. This person understandably developed real concerns about efficiency and wasted time.

Flexibility was most evident in the way that success in one context, led many people to increase their confidence, take more risks and change their attitude so that they could, unsupported, experience success in new contexts.

Creative solutions while occurring at low levels, as people explored and played with new possibilities, were not strongly evident for this group. This was possibly because new tool experience tended to dominate their practice and mostly they did not then take these tools and put them to real use in their own contexts. They were often preparing themselves for future practice in a general rather than a specific way, learning new skills, setting up structures, but not quite taking it through to full implementation.

Motivation was required for people to join the group and commit to ten weeks and involvement with action research. Therefore they all had an interest in expanding or enhancing their digital information literacy. Motivation, for some was enhanced by the group context. Seeing what other people were doing and being part of a group with common interests having a strong positive impact.

Although a few began cautiously, all demonstrated some level of risk taking as they exposed themselves to the online world, or just pressed keys and made choices without worrying about the outcomes. Moving from the boundaries of commercial software where experimentation had been within applications to the wider possibilities and choices of Web 2.0 technologies was a step into the unknown for some participants. Others seized opportunities to extend their knowledge of web based possibilities. All tried new tools. One person described how “the excitement of conquering” something new led to a desire to explore further.

Curiosity led many down these new paths, but for some this was countered by their concerns about time wasting. Playing with the tools was seen as beneficial by some, but others felt guilty about using precious time for this purpose and one had to be convinced that it was OK to follow up the sessions in work time. Constraints such as lack of access to a computer, through family competition, competing demands for time and the need to wait for help in workshops, also impeded motivation in some instances.

The person who left the project early could have been considered to have lost motivation, but it is also possible that she had achieved what she needed to present her essay appropriately. She had expressed strong satisfaction with what she had learned. However, because this participant did not inform the researchers that she was leaving, it was not possible to collate all the evidence for her action research cycles.

Reflection was engaged in by all participants, in the form of blogs. They were also asked to reflect on their practice using a three step action research framework. These reflections ranged from lists of what had been done, through expressions of their feelings about their learning and consideration of options available, to deep philosophical discussions about the role of the Internet, informed critiques

of viewpoints and suggestions about ways to change workplace practices in the light of digital possibilities.

Some attracted responses to their blogs and then responded, or acted in new ways as a consequence. Facilitators interacted with group members via these blogs which maintained links between workshops and provided insights into participant thinking.

One participant saw reflection as a tool to facilitate her learning and improve her ability to solve problems. Two group members were also interested in the action research from the perspective of experiencing it from participant level. One did find it hard to remain motivated when required to fit her practice to the diagram. She did so very concientiously, but said she was motivated by knowing the researchers.

Interaction was occurring at many levels. Although web tools enabling online interaction were used by all group members, it was the face to face workshop interaction which drew most favourable comment. Only one person became less interested in the the workshops and more involved with her online communities. There were a few comments from participants on each others blogs and occasional emails, this was favourably received, but not sustained even for the duration of the project. The advanced blogger was the person most likely to keep in contact with others. She had by time the project began built up her own circle of readers and some of these people engaged in discussion which overlapped with the project. However, when she made specific pleas for content and ideas related to her goals, from her professional community, they did not respond. On the other hand questions about using specific tools such as Animoto drew responses, suggesting that people with computer interests might often be blog readers.

Two people from one of the other DIL groups found their way to these blogs through Wikieducator, and showed interest, but this did not lead to ongoing cross group interaction. Collaborative editing of wikis was another form of interaction mentioned by two participants. Another form of interaction appreciated by three participants occurred with flatmates and family. For one person being able to communicate with family about digital matters and to share her new skills with them was very important. For another being able to solve her own problems rather than just have others do it for her also brought about change.

Sharing resources was a goal for several people. The methods investigated included PowerPoint presentations to be shared online, a database of textile resources, a library of links placed on de.licio.us, CamStudio presentations and videos which could be placed on YouTube or another repository. Because these were not taken to full implementation level during the project, feedback from users was not available.

Technical aptitude was an important precursor, often for the development of resources, or the management of incoming online feeds. One person used the term “technophobe” with reference to herself and another expressed concern at the beginning that she would not be able to perform simple tasks such as bookmarking. Even among some of the confident and experienced there were situations when they found that the ideas and vocabulary associated with some Web 2.0 contexts were quite unfamiliar. No-one found mastery of new tools was simple. Complications included needing to work on different machines, trying to download photos which had been deleted by a family member, forgetting usernames and passwords, time and size constraints on free applications and lack of knowledge of the the terms being used.

Almost everyone mentioned at some stage being frustrated, or even angry, and this arose from their inability to master some technical aspect. However, this was more than compensated for by the delight and excitement of success which eventually did come, even if only in part, to everyone. In all cases, except perhaps a person with a high level of knowledge, working on a specialised project, there was considerable expansion of technical knowledge and vocabulary and with this came usually, an attitude shift which often led to them undertaking new technical challenges independently.

All participants, except one had a positive **belief** about how a digital environment could enhance their professional skills. Other relevant beliefs came from one group member who wrote at length about issues and stated her position on these. She considered openness to be very important and did not want to see professionals hiding their identities in online contexts. She also did not believe that work and recreation could be separated and saw her PLE as flowing across these two domains. She also believed that flexible work practices should be made possible through the use of online teaching and learning environments. Another participant expressed concern that productivity was being compromised through moving to new digital contexts, with large time input for small results. The belief that young people will need more skills in a digital world where fantasy and reality are jumbled up, was also expressed.

Case Study: Institution Four

Introduction

There were 10 participants in the Institution Four group. Three of those did not complete. One attended only the first session. Another came several times to the workshops and met with the facilitator separately but did not do the surveys. The third person, an ICT lecturer, was enthusiastic, but work commitments prevented her attending the required number of sessions and she did not do the post survey. The latter two are referred to where relevant.

Of the seven who completed, three were students, with one of those doing a very small amount of lecturing, one was a librarian and a post graduate student, one was general staff and two were lecturers, one of whom was also doing post graduate studies.

The group had a staggered start due to an awkward fit with semester times. Despite support being individually tailored, this was mentioned as having an impact by at least one latecomer.

Of the nine participants discussed, five rated themselves quite lowly in terms of initial experience and competency in the DIL field and the other four had all round, or particular strengths. Three of these worked in supporting other people with various aspects of ICT. Except from the viewpoint of one participant, having a mix of people at various “levels” was considered a positive feature of the group. Everyone acknowledged learning from other group members. Sometimes this was in relation to their stated goals, but mostly it was unexpected learning arising from sharing what each group member was doing. In at least one case this totally changed the participant’s direction from exploring the educational potential of Second Life to creating with Scratch and introducing this to primary age children. While all worked towards, and to some extent achieved their goals, these were mostly modified, or added to, through their group involvement.

Online group interaction was encouraged through the group chosen, medium of Facebook which was already being used extensively by three group members. Everyone was set up for this, but it did not take off, with only two people (established members) using it as the place to link to their contributions and reflections. One new member who tried to get involved expressed disappointment that his efforts were not responded to. He did set up a feed from the blog of a person in one of the other groups and mentioned learning from that experience. While setting up feeds from information sources of strong interest was done by several, active engagement in an online group was only mentioned by one participant for whom it was a real breakthrough after never having had the courage to contribute before. He then took another step and set up a collaborative group at national level using Google documents. In one case the blog intended for workplace interaction didn’t produce any discernible participation.

Aspects of DIL which were important to participants

Recognition, in the context of this project, usually related to becoming aware of what particular tools would do and/or discovering new tools, especially Web 2.0 ones, which they had not used before. For several participants one of the most useful sessions related to RSS feeds which were previously used by only one group member. Unlike Google maps, Google Analytics and photo sharing possibilities which attracted favourable attention the feeds lead to action by many and because of their nature this meant that they were receiving ongoing information from valued sources.

Access to new information sources was appreciated by many participants. Social bookmarking required encouragement, but for one person, exploration then became revelation as she realised that highly valued and difficult to obtain sources were there at her fingertips. While IL techniques encourage carefully planned and focussed information seeking it was apparent that many of the finds most appreciated came from less focussed exploration, or from casual references made by others. Time for exploration appeared to be very important and several group members mentioned the value of having to attend sessions, but then being able to give themselves the opportunity to play or explore.

Evaluation pervaded almost everything people did. Whether staff or students they almost all thought critically about the objectives they set for themselves and the tools they chose to use. This reflected the facilitation mode, which meant participants had their own purposes in mind and were in general encouraged to consider different possibilities and not just shown one possible solution. For one person this lack of structure was found to be almost overwhelming at first, but later he found that he could go away from the sessions and think about what he could take from them. He then cautiously set things up that they could benefit his ongoing learning and interactions - so cautiously that he did things in duplicate, once for exploration purposes, then for genuine interaction with others. It was evident that it is not just the information and information sources that were being evaluated, but also the tools and the implications of using these tools. A demonstration of Twitter, for example, by a group member, led to an animated discussion about online ethics and dangers and comparisons with face to face behaviour.

Management strategies were evident as people chose methods of recording their action research information/reflections as well as finding ways of managing their online involvement. For at least three people Google Reader was a chosen tool. Several favoured simply keeping records in word processing documents in a diary type format, but other linked actual examples of what they were doing; Scratch creations and video editing alternatives and examples to their facebook site. Those with least confidence also wanted to keep clear lists of instructions for future reference for such tasks as scanning and creating powerpoint presentations. Mangement of files through carrying them on a memory stick and hence avoiding institutional barriers to working with students in computer labs, not accessible through the staff network, was important for one person.

Application was the strongest focus for this group. They tended to be users of information, rather than seekers, although the latter obviously supported the former. However, in most instances they already had the information they needed and they were seeking new ways of sharing it with other people, or they sought new ways of engaging people in online environments. In one instance the process was more complete as the participant found out about Scratch, recognised its potential for a school holiday activity group, accessed online instructions and taught himself how to use it, prepared demonstration material, trialled it with the children, discovered more instructional material, and adapted this to provide guidance for subsequent groups. For three participants preparing PowerPoint presentations provided them with a real focus for extending their DIL in many ways. While being guided to consider the pros and cons of these types of presentation they also discovered new sources of images and videos, considered copyright issues, and moved from fairly mundane, wordy efforts to those which were much more creative and invited participation through links for users outside of classes. They became excited by the use of colour and images and how this could add new dimensions to their teaching. In two cases they stressed how important it was for them to repeat the processes many times to consolidate their learning. The participant who did not complete was faced with learning how to use a new “$100” computer with an alternative operating system and to travel to the Pacific Islands to implement its use.

Ethics and issues often were discussed within the group. The chosen format was to present a tool, or issue for discussion in the first 20 minutes of the two hour sessions. Copyright, privacy, Internet safety, plagiarism and institutional barriers to using online tools were among the issues which arose. The introduction of the cheap computer, provided for the Pacific Island children revealed that implications of this sort of gift need to be very carefully thought through in advance. One group member was very aware of the ethics of online interactions and saw it as his responsibility to become aware of the "norms and traditions" of particular sites and considered that he was bound by their rules when he chose to join. Having a librarian in the group enabled clear explanations of copyright and attribution licences and an awareness of Creative Commons.

Participant Capabilities

Examination of these capabilities is associated with observed or self reported change during the project. In terms of self efficacy, **confidence** is an important aspect which is measured in the pre and post survey results reported elsewhere. Five of the participants through their reflections and /or their focus group interview contributions described low levels of confidence at the beginning of the project and major improvement during its course. Two people spoke of physical symptoms, so extreme that in one case it had seriously impeded her efforts to use digital technologies for work purposes and the other had taken pride in being a "techno dinosaur". This lack of confidence was associated with a narrow range of tools they were familiar with; email and word processing. Even here their experience was limited. Some were very pleased to find ways of organising and locating emails and one enrolled for a word processing course concurrent with the project. Despite the lack of confidence levels of persistence were high providing the barriers were small or non existent. Technical hitches threw some of these people and finding that others had similar problems was a positive effect of the group. For one person starting with an individual session with the facilitator outside the group was beneficial and being able to stop as soon as she was experiencing"overload" was appreciated too. A two hour session was initially too long.

Four of these people were most appreciative of the project experience and described major change. (The fifth didn't complete) One stressed her attitude change and mentioned her willingness to "give it a go" contrasting with her earlier attitude where she "shunned tools because I thought that using them was going to be too difficult". Another spoke of " a hunger to try new technology" and said it had "opened a new world" for her. A third described the relief of sitting down at a computer without her heart beating rapidly. She now found it "exciting" and saw "great possibilities". She would like to have taken leave from her job to "get on with it". The fourth person realised the "inevitability" of changing his ways and from avoiding online tools he moved to wanting to set up his own communities for specialied purposes. His confidence was boosted by knowing that he could go to online sources such as videos and wikieducator and find instructions on how to do things. He also found support from a person within the group which helped him not to be fearful and to feel that it was OK to be "sort of left footed".

The confident people all had the ability to get on with things and were largely self directed, while as would be expected the others appreciated more facilitator and group support, although some had clear goals. Confidence and persistence didn't necessarily go together as one very confident person was insistent that he had to grasp things quickly or he wouldn't bother with them. He felt that well designed applications would enable this to happen.

Problem solving was sometimes beyond the capabilities of those with less experience. They didn't know why things wouldn't work and couldn't start to solve their own problems. One session when a computer glitch caused problems even for the facilitator, seemed a relief to them, after the initial frustration, as they tended to feel that they were responsible for what went wrong, so would not

necessarily seek help. Having an ICT person from their workplace in the group, and knowing that she could help them in future was also valuable for two participants.

One group member was extremely logical and she very carefully outlined her competencies that she brought to the course and then identified what she needed to develop further and which areas she had little knowledge of. Throughout she carefully recorded her progress and reflections. Her previously mentioned attitude shift gave her a developing flexibility demonstrated through transfer of strategies from one situation to another. The “can do” attitude of the more experienced group members led them to accept new challenges and to solve problems with relative ease. It was however evident in two cases that solving technical problems and setting things up for others to use, doesn’t necessarily deal with the human factors which intrude into digital environments. You can’t make other people participate in online groups, nor can you anticipate the actions of others who may have power, but little knowledge of the implications of their actions.

Almost all group members demonstrated aspects of creativity, whether experienced or inexperienced. Once the less experienced reached a basic level of competency, their personal flair was able to shine through as they drew on non digital strengths and interests to enhance their digital products. This tended to be associated with enjoyment, and a strong desire to try more things.

Motivation needed to be present for the person to take the steps to join the group. Several came with clear goals and saw this project as a way of being supported to do something they needed to do. Others had a strong interest in the field and were interested to know what other people were doing. In one case the person reported that he had become stale and that his enthusiasm for video production, a long held interest, had waned. With his fortuitous discovery of Scratch he was rejuvenated, but this did come through his openness to new things. What the goal focussed people found was that they were exposed to many new things and sometimes exploring these was a rewarding diversion from their main focus. Other times they stored that information, thinking that they would return to it when it had more relevance for them.

One of the experienced people shifted his focus as he came to realise what it was like for learners who did not have a wide digital background. He came with the intention of exploring new tools for interaction in work and student groups he was involved with. By the end he felt that his appreciation of the learner’s perspective through working with and observing others in the group was his biggest gain, although he did not develop his own skills a great deal. Strength and availability of a real purpose seemed to be very important for motivation. This was apparent for all except one whose purpose was related to the more distant future. He did the exploratory work, talked knowledgeably about his findings, but didn’t implement except for a skeleton, which could have been developed later.

All of the group demonstrated a willingness to **interact** with each other, or at least with the faciliatator(s), and for some in online environments. The importance of attending and interacting with a group of diverse people, mostly not known to each other, was appreciated. The confidence to ask and offer help grew noticeably for the less experienced. Who they sat next too, usually different people, mattered, and very interesting conversations and sharing of knowledge and skills emerged in all sessions. The experienced people also enjoyed seeing something new and this happened, except for one person, who found that his level of DIL mostly exceeded that of the rest of the group. He made some very valuable contributions through sharing some of his interests such as Google Analytics, copyright knowledge and Twitter with the whole group.

Reflection was engaged in by all participants, but this was not always in the planned formats. Three people kept detailed reflective “journals”, two linked whatever they were doing to Facebook. This tended to be examples of their explorations, or demonstration material. However, one of these people

used his linked blog to assemble quotes relating to the use of blogs for academic purposes and he annotated these quotes with his own views, hence providing relevant reflections on one aspect of Web 2.0. He wrote challengingly about the need for academic institutions to change in relation to these tools. One person shared his thoughts, often deep, in the workshops and contributed strongly in the focus group interview. The other participant joined the group late and had less opportunity for group interaction, but his discussion with the facilitator demonstrated an awareness of a relevant range of issues associated with his web development project. he began a written journal. The group was presented with information on action research and all were aware of how it fitted with the project. Fitting what they were doing into action research cycles was less easy. One tried and said it didn't work for her. Another critiqued the approach and concluded that he was engaging in reflective practice, rather than action research as he had changed his purpose totally and therefore hadn't revisited the beginnings and engaged with an action research spiral. For several it was considered advisable to focus on their goals and not to overlay other requirements which could interfere with this focus. However, from what they wrote and said elements of action research could be discerned and plenty of data was provided, about their progress towards DIL related goals.

The ability to critically evaluate what they were doing, and broader aspects of DIL, if not evident in written form, was present in their group contributions, in the workshops and/or in the focus groups, in all cases, for those who completed.

With reference to **technical aptitude**, one participant found that learning appropriate terminology was very valuable. She now found herself able to take part in discussions outside the group which she could not do previously. Others of the less experienced ones were able to associate the new terms with their new skills. Writing things down helped them. Even for those with a wide range of competencies there were new things to learn. Two, for example had not previously set up RSS feeds, and wanted to know about pod casting. Repetition was stated to be very important in doing even quite straight forward tasks. Some engaged in much of this, for example 17 PowerPoint presentations. Associated with growing technical aptitude and the associated vocabulary was a reported delight in being able to share this with others, such as children and colleagues.

All participants had a positive **beliefs** about what a digital environment could offer for them and others. At the beginning for at least three there was the thought that they needed to, engage with this environment rather than that they wanted to. By the end of the project they just wanted to do more and more, and were strong in their beliefs that it had much to offer in terms of collaboration, information sources, interaction and tools that could support their research, study and presentation of ideas. Others shared the pleasure of discovering new tools and strategies and believed that these would enhance their teaching, or their interactions with others.

Appendix 13 – Results

- Participants' qualifications, areas of study and discipline for study or teaching
- Figures - Changes to digital and traditional information skill ratings on entry and exit to the project.
- Figures - pre-survey and post-survey comparison of the frequency with which participants rated traditional and digital skills as higher or the same.
- Figures - changes in mean DIL Scores for each institutional

Table 23: Participants' qualifications, areas of study and teaching (n=42).

Institution	Existing qualifications	Qualifications being studied	Study or Teaching Discipline
1	Masters Technology BBS School certificate BSW (Hons) PG Dip Arts Masters in Biology, German University MEd (hons), BA, RGON, RM. MNZAC BA; MA/LLM; PG Dip. Bus.Mgt.; PG Dip Adv. Labor Law Diploma of Business Studies PhD Nil x2	BA Cert. in Small Business Management BA/BBS PhD in Biology PhD Business Bachelor of Business Studies Bachelor of Business Studies	IT University campus; extramural Social Work English/Management Biology Psychology, Counselling Strategic management; Entrepreneurship and Small Business Management and Entrepreneurship Communication Management Management Communication Nil x1
2	B.Com, B.Ed, M.Ed, PhD; HED Diploma level ACAT; DipTch (ECE); DipArts; M.Ed (1st hon.) MEdMgt; BsCHons;PGCE;Dip Tchg MA; ACAT MA, MBA, NZLA Cert, CTT Diploma in Performing Arts-Voice Vocal Advanced Cert. , ACAT,	Language; Literacy Maori Broadcasting Diploma PhD Diploma in Maori Media Studies MA Social Work Foundation Studies Certificate Certificate in Tertiary Teaching Nil x1	Beauty therapy Communication Early Childhood Education; Arts Education Education Education, Technology and Management Foundation Studies Foundation Studies Foundation Studies Hairdressing

	Diploma C & G Year 13 Certificate of Academic Achievement Postgraduate Diploma Special Education, Social Policy, Social Wefare.PG Cert Human Resource BA Sociology, Counselling. Diploma Counselling, Social Work MA (Hons) in Education, BA, DipTchg (Primary), CTT Year 13 Certificate of Academic Achievement Certificate of Early Childhood Development; Diploma of Teaching; B.Ed. (Teaching) Early Childhood Education; Post Graduate Diploma (Early Years) Diploma in Information Systems Nil x1		Librarianship Library Media Social Science Social Work, Early Child hood, Counselling
3	Master of Business Studies; BA(Hons); Dip Teaching Diploma Nursing; Masters Nursing BA, Diploma Nursing, Post Grad Diploma Prof Nursing Certificate in Creative Studies Bachelor of Teaching(primary) Adult Certificate in Teaching and Learning Bachelor of Fine Arts Diploma of Professional Studies, bsc (hns) health studies, ma (midwifery) BA, PGDA, MEd. TESOL, BA, PGD (Arts), Cert. TESOL, Cert. Adult Literacy	Bachelor of Design majoring in Communication Bachelor of Communication Design BFA Certificate in Tertiary Teaching GCTLT Graduate Certificate in Teaching and Learning GTLCT Masters of Fine Arts PhD	Communication Design Human Resource Management Nursing Nursing Fine Art multimedia developer Computing Art Registered nurse, registered midwife Education social services Design

	Teaching High School Certificate, Certificate in Graphic Design		
4	Bachelor of Education BEd, Dip Tch, PostGrad Dip Tch BA, BSc, Diploma of Teaching BA(Hons), DipGrad Bachelor of Arts Teaching Certificate. Bachelor of Education, Master of Education B Ed Dip. Youth and Community Work Bachelor of Sport (Coaching), Postgraduate Diploma Physical Education (Exercise Psychology) Level 3 NCEA	MSc BSc, PGDipArts MA Applied linguistics Postgraduate Diploma in Public Health BAppSc. Nil x2	Information Science Education Technology/ICT E-learning/ICT Health Psychology Theatre Studies, Central Library Reference Skills Education Curriculum English Health Math, management, design.

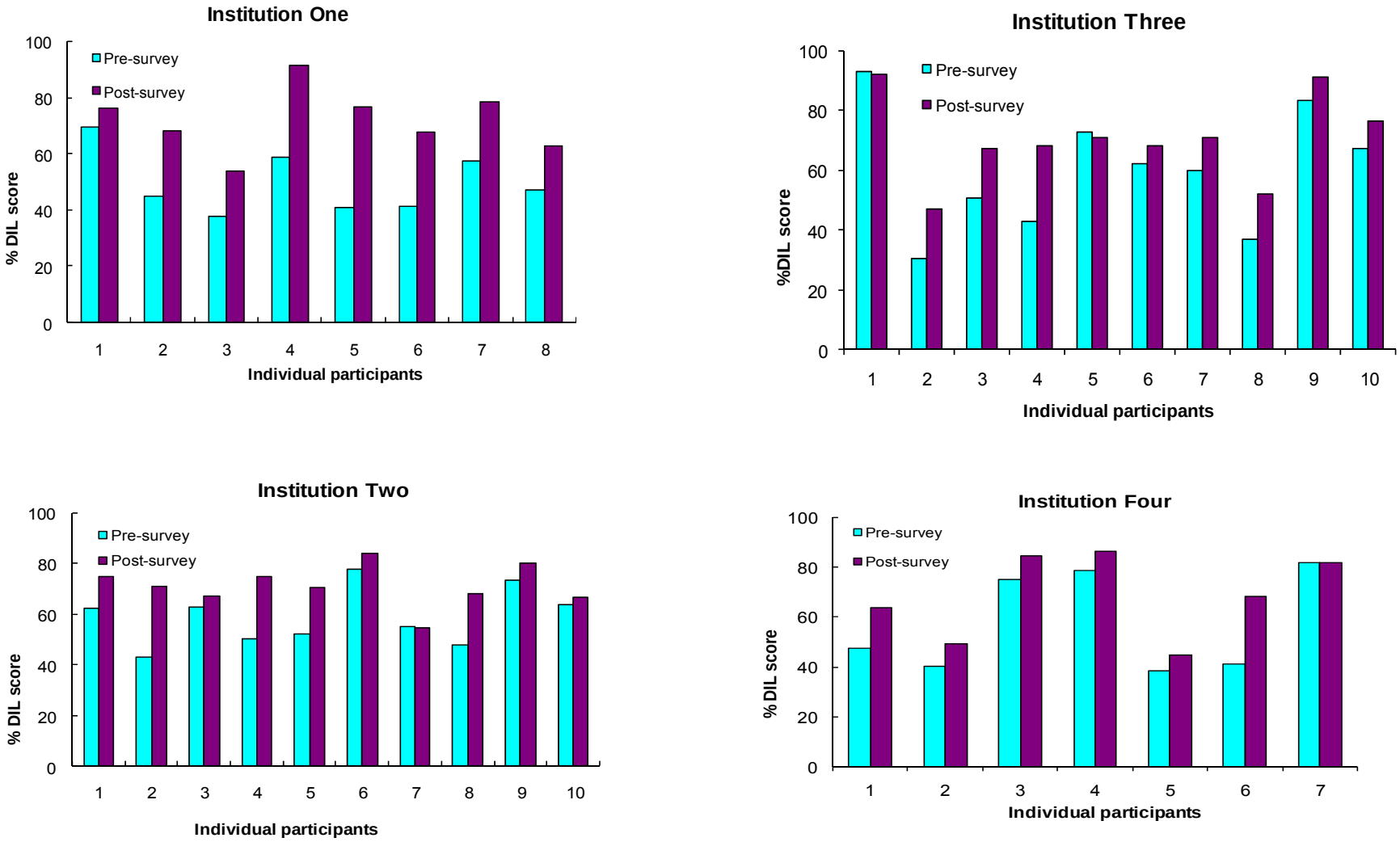

Figure 26: A comparison of individual pre-survey and post-survey digital information literacy scores across four institutions

Appendix 14 – Example survey report - Results

Digital Information Literacy Project
Project Researchers
Results Report

Number of Valid Respondents: 11

Date Survey Opened: 14 May 2008

Date of Report 13 July 2009

Part A

Demographic information

Role

		Frequency	Percent
Valid	Both	5	45.5
	Student	4	36.4
	Teacher	2	18.2
	Total	11	100.0

Gender

		Frequency	Percent
Valid	Female	10	90.9
	Male	1	9.1
	Total	11	100.0

Ethnicity

		Frequency	Percent
Valid	New Zealand European/Pakeha	11	100.0

Age

		Frequency	Percent
Valid	21 to 30 years	3	27.3
	31 to 45 years	2	18.2
	46 to 59 years	6	54.5
	Total	11	100.0

Computer Experience

		Frequency	Percent
Valid	Less than one year of experience of computer use	1	9.1
	Three years or more of experience with computers	10	90.9
	Total	11	100.0

Internet Use

		Frequency	Percent
Valid	Infrequent use of Internet	1	9.1
	Regular use of Internet	10	90.9
	Total	11	100.0

Existing Qualifications

- Master of Business Studies; BA(Hons); Dip Teaching
- Diploma Nursing; Masters Nursing
- BA, Diploma Nursing, Post Grad Diploma Prof Nursing
- Certificate in Creative Studies
- Bachelor of Teaching(primary) Adult Certificate in Teaching and Learning
- Bachelor of Fine Arts
- Diploma of Professional Studies, bsc (hns) health studies, ma (midwifery)
- BA, PGDA, MEd. TESOL,
- BA, PGD (Arts), Cert. TESOL, Cert. Adult Literacy Teaching
- High School Certificate, Certificate in Graphic Design
-

Qualifications Currently Studying

- Bachelor of Design majoring in Communication
- Bachelor of Communication Design
- BFA
- Certificate in Tertiary Teaching
- GCTLT
- Graduate Certificate in Teaching and Learning
- GTLCT
- Masters of Fine Arts
- PhD

First language/Mother Tongue

		Frequency	Percent
Valid	English	11	100.0

Study Type

		Frequency	Percent
Valid	Certificate course student; Part time student	1	9.1
	Full time student	2	18.2
	I am not a student	3	27.3
	Part time student	1	9.1
	Postgraduate student	2	18.2
	Postgraduate student; Full time student	1	9.1
	Undergraduate student; Full time student	1	9.1
	Total	11	100.0

Part B Information Literacy

Level of Skill

		Very low	Low	Average	High	Very high	Total
Locating, retrieving, analysing and applying information	n	2	0	4	3	2	11
	%	18.2%	.0%	36.4%	27.3%	18.2%	100.0%
Using traditional skills	n	2	2	4	2	1	11
	%	18.2%	18.2%	36.4%	18.2%	9.1%	100.0%
Familiarity with the New Zealand or Maori contexts of assigned topics	n	4	1	6	0	0	11
	%	36.4%	9.1%	54.5%	.0%	.0%	100.0%

Degree Each of the Following Applied to Respondents

		Not at all	A little	Somewhat	A lot	Very much so	Total
I am moving into situations which require me to apply more sophisticated, information gathering skills in increasingly demanding academic contexts	n	0	0	1	4	6	11
	%	.0%	.0%	9.1%	36.4%	54.5%	100.0%
I need to develop my own digital information skills in relation to the location, retrieval, analysis and application of information in order to support and teach other people	n	2	0	0	3	6	11
	%	18.2%	.0%	.0%	27.3%	54.5%	100.0%
I lack confidence in using digital/computer technologies to prepare or create materials because I am unfamiliar with the tools or methods	n	2	2	4	1	2	11
	%	18.2%	18.2%	36.4%	9.1%	18.2%	100.0%

Comments

- I am phobic, and quickly lose patience when things don't work for me. I am very slow too.
- I get quite excited when I learn new skills but find it is quite time consuming. I'm pretty 3 in my ability and want to become more confident in use of multimedia to support my teaching
- Am able to recognise good resources but unable to 'manipulate' it. I.e. to store for reference or adjust to my purpose. I might only want a segment of the information and might want to present to someone in a different format.
- confidant with using digital information gathering for further application to studies etc.
- at the moment object oriented programming (oop) is what I'm getting my head around, it is modular/component based, so it is flexible and re usable
- I have created wikis,blogs,and used software to create resources that includes Audacity, camtasia
- I have a general knowledge about several programmes but require more in depth knowledge.
- I am still unfamiliar with applying efficiently and articulating my understanding of digital tools and although I have had some experience for a number of years with different multimedia technology of academic writing have not had much experience to date re online publication of academic writing and multimedia production

When locating, retrieving, analysing or applying digital information how often are the following used

		Have never used	Have used at least once	Would like to use more	Prefer not to use	Use less than once a month	Use at least once weekly	Total
Online library databases	n	1	1	3	1	2	3	11
	%	9.1%	9.1%	27.3%	9.1%	18.2%	27.3%	100.0%
Internet search engines	n	0	0	0	0	1	10	11
	%	.0%	.0%	.0%	.0%	9.1%	90.9%	100.0%
Online directories	n	1	1	4	0	2	3	11
	%	9.1%	9.1%	36.4%	.0%	18.2%	27.3%	100.0%
Blogs	n	3	1	1	0	1	5	11
	%	27.3%	9.1%	9.1%	.0%	9.1%	45.5%	100.0%
Social bookmarks	n	4	2	0	0	1	4	11
	%	36.4%	18.2%	.0%	.0%	9.1%	36.4%	100.0%
Webfeeds /newsreader	n	4	3	1	0	0	3	11
	%	36.4%	27.3%	9.1%	.0%	.0%	27.3%	100.0%
Book sharing	n	7	3	0	0	0	1	11
	%	63.6%	27.3%	.0%	.0%	.0%	9.1%	100.0%
Computer Conferencing	n	5	2	0	0	1	3	11
	%	45.5%	18.2%	.0%	.0%	9.1%	27.3%	100.0%
Email discussion groups	n	5	2	0	0	0	4	11
	%	45.5%	18.2%	.0%	.0%	.0%	36.4%	100.0%
Wikis	n	1	2	1	0	1	6	11
	%	9.1%	18.2%	9.1%	.0%	9.1%	54.5%	100.0%
File sharing	n	7	1	2	0	0	1	11

	%	63.6%	9.1%	18.2%	.0%	.0%	9.1%	100.0%
Video sharing	n	4	1	1	0	2	3	11
	%	36.4%	9.1%	9.1%	.0%	18.2%	27.3%	100.0%
Photo sharing	n	3	5	1	0	0	2	11
	%	27.3%	45.5%	9.1%	.0%	.0%	18.2%	100.0%
Presentation sharing	n	8	0	1	0	0	2	11
	%	72.7%	.0%	9.1%	.0%	.0%	18.2%	100.0%
Social spaces	n	6	1	0	0	0	4	11
	%	54.5%	9.1%	.0%	.0%	.0%	36.4%	100.0%

EG Google to Internet Search Engines

		Extremely unconfident	Unconfident	Neither confident nor unconfident	Confident	Extremely confident	Don't know what this is	Total
Online library databases	n	1	1	4	3	2	0	11
	%	9.1%	9.1%	36.4%	27.3%	18.2%	.0%	100.0%
Internet search engines	n	0	1	1	9	0	0	11
	%	.0%	9.1%	9.1%	81.8%	.0%	.0%	100.0%
Online directories	n	2	1	3	5	0	0	11
	%	18.2%	9.1%	27.3%	45.5%	.0%	.0%	100.0%
Blogs	n	2	2	3	4	0	0	11
	%	18.2%	18.2%	27.3%	36.4%	.0%	.0%	100.0%
Social bookmarks	n	4	1	1	5	0	0	11
	%	36.4%	9.1%	9.1%	45.5%	.0%	.0%	100.0%
Webfeeds/ newsreader	n	3	5	0	3	0	0	11
	%	27.3%	45.5%	.0%	27.3%	.0%	.0%	100.0%
Book sharing	n	4	3	3	1	0	0	11
	%	36.4%	27.3%	27.3%	9.1%	.0%	.0%	100.0%
Computer Conferencing	n	4	4	0	3	0	0	11
	%	36.4%	36.4%	.0%	27.3%	.0%	.0%	100.0%
Email discussion groups	n	3	2	2	4	0	0	11
	%	27.3%	18.2%	18.2%	36.4%	.0%	.0%	100.0%
Wikis	n	2	1	3	5	0	0	11
	%	18.2%	9.1%	27.3%	45.5%	.0%	.0%	100.0%
File sharing	n	4	3	3	1	0	0	11
	%	36.4%	27.3%	27.3%	9.1%	.0%	.0%	100.0%
Video sharing	n	4	1	2	4	0	0	11
	%	36.4%	9.1%	18.2%	36.4%	.0%	.0%	100.0%
Photo sharing	n	5	1	1	4	0	0	11
	%	45.5%	9.1%	9.1%	36.4%	.0%	.0%	100.0%
Presentation sharing	n	5	3	1	2	0	0	11
	%	45.5%	27.3%	9.1%	18.2%	.0%	.0%	100.0%
Social spaces	n	3	1	3	4	0	0	11
	%	27.3%	9.1%	27.3%	36.4%	.0%	.0%	100.0%

Any other items used when locating, retrieving, analysing or applying digital information

- Fairly confident about learning to use programs through help menus or online tutorials etc. The most limiting thing for me would be not being aware of available resources or making any real effort to find them.
- I have used some of these media once I would like to use some more often particularly Skype, Elluminate, bloglines, de.lici.ous but lack confidence and a purpose.
- referencing and creating copyright licence is now a fulltime complex challenging area that is something to be aware of.

Any other comments about locating, retrieving, analysing or applying digital information

- Fairly confident about learning to use programs through help menus or online tutorials etc. The most limiting thing for me would be not being aware of available resources or making any real effort to find them.
- I have used some of these media once I would like to use some more often particularly skype, elluminate, bloglines, de.lici.ous but lack confidence and a purpose.
- Referencing and creating copyright licence is now a fulltime complex challenging area that is something to be aware of.

Personal Feeling

		Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree	Total
I am confident about my ability to teach well in a course that requires me to use computer technology	n	2	2	2	2	3	11
	%	18.2%	18.2%	18.2%	18.2%	27.3%	100.0%
I feel at easy learning how to use them	n	1	1	3	3	3	11
	%	9.1%	9.1%	27.3%	27.3%	27.3%	100.0%
I am not worried about making mistakes	n	1	3	0	4	3	11
	%	9.1%	27.3%	.0%	36.4%	27.3%	100.0%
I feel anxious about using them	n	2	2	3	2	2	11
	%	18.2%	18.2%	27.3%	18.2%	18.2%	100.0%
The thought of using unfamiliar technologies and tools is uncomfortable	n	2	3	1	3	2	11
	%	18.2%	27.3%	9.1%	27.3%	18.2%	100.0%
Overall, I believe they enhance my professional skills	n	0	0	0	4	7	11
	%	.0%	.0%	.0%	36.4%	63.6%	100.0%
I think learning how to use them is easy	n	2	6	2	1	0	11
	%	18.2%	54.5%	18.2%	9.1%	.0%	100.0%
I enjoy trying different computer technologies and online tools	n	2	0	3	3	3	11
	%	18.2%	.0%	27.3%	27.3%	27.3%	100.0%

Comments about Personal Feeling

- I'm not someone who likes to read instruction manuals, although I can if I absolutely have to. I learn a lot quicker and more enjoyably with hands on approach with someone to guide me. For example, it took me 6 months to get round to learning how to use the new DVD recorder. It actually took me 5 minutes to 'pick it up' and I now love it and use it all the time. I'm hoping to be able to discover DIL in a way that will cause me little anguish!
- My confidence is stronger the more I use the technology, but often using it is patchy with intensive periods then months without using it so I tend to forget until I get myself up to speed again. Sometimes finding time to THOROUGHLY learn the technology is difficult and I go for the 'quick and dirty' solution rather than the practiced one.
- Not likely to be required to teach, but in the context of learning much the same applies.
- The basics of power point is probably the extent of my confidence when teaching. Other tools make me feel nervous as I worry it may not work when I'm in front of students. I would like to have more time to increase my skills
- There is a fear of failure and concern for the digital divide, and then there is a high pressure situation that will require troubleshooting feelings of inadequacy.
- Very nervous about learning new things, but need and want to learn
- When I began learning to use online tools I didn't like making mistakes but I feel that I have managed to get over this. I enjoy learning new skills and sometimes I don't feel at ease with them.

Section C Use of methods

Level of confidence in the use of the items listed

		Extremely unconfident	Unconfident	Neither confident nor unconfident	Confident	Extremely confident	Have not used	Total
Web-based learning management systems	n	1	0	1	7	1	1	11
	%	9.1%	.0%	9.1%	63.6%	9.1%	9.1%	100.0%
Websites	n	0	1	1	5	4	0	11
	%	.0%	9.1%	9.1%	45.5%	36.4%	.0%	100.0%
Discussion Boards/Forums	n	2	0	2	3	2	2	11
	%	18.2%	.0%	18.2%	27.3%	18.2%	18.2%	100.0%
Computer applications/software	n	1	1	2	5	2	0	11
	%	9.1%	9.1%	18.2%	45.5%	18.2%	.0%	100.0%
Online Chat	n	0	4	3	1	2	1	11
	%	.0%	36.4%	27.3%	9.1%	18.2%	9.1%	100.0%
Email	n	0	1	0	5	5	0	11
	%	.0%	9.1%	.0%	45.5%	45.5%	.0%	100.0%
Software to create web pages	n	4	0	1	3	1	2	11
	%	36.4%	.0%	9.1%	27.3%	9.1%	18.2%	100.0%
Computer conferencing	n	3	2	2	1	1	2	11
	%	27.3%	18.2%	18.2%	9.1%	9.1%	18.2%	100.0%
e-Journals/e-portfolios	n	3	1	3	1	1	2	11
	%	27.3%	9.1%	27.3%	9.1%	9.1%	18.2%	100.0%
Audio in digital formats	n	3	3	0	2	1	2	11
	%	27.3%	27.3%	.0%	18.2%	9.1%	18.2%	100.0%
Digital videos	n	4	2	0	2	1	2	11
	%	36.4%	18.2%	.0%	18.2%	9.1%	18.2%	100.0%

Add others you may have used

- Again I use what I have to use when I need to and sometimes that means learning something new or finding tracks through to what I need and leaving the rest. The technology as a tool not a subject for me.

Scenario

How confident would you be ….

		Extremely unconfident	Unconfident	Neither confident nor unconfident	Confident	Extremely confident	Total
... if there was no one around to tell you what to do as you go	n	2	2	1	5	1	11
	%	18.2%	18.2%	9.1%	45.5%	9.1%	100.0%
... if you had only instruction manual for reference	n	2	4	1	3	1	11
	%	18.2%	36.4%	9.1%	27.3%	9.1%	100.0%
... if you could call someone for help if you got stuck	n	0	2	2	4	3	11
	%	.0%	18.2%	18.2%	36.4%	27.3%	100.0%
... if someone else had helped you get started	n	0	2	2	5	2	11
	%	.0%	18.2%	18.2%	45.5%	18.2%	100.0%
... if you had a lot of time to learn how to do the task	n	0	0	2	5	4	11
	%	.0%	.0%	18.2%	45.5%	36.4%	100.0%
... if there was someone giving you step by step instructions	n	0	0	2	4	5	11
	%	.0%	.0%	18.2%	36.4%	45.5%	100.0%

Comments

- According to the scenarios above it seems that all the information would be available it would just be a matter of applying it which would be relatively straight forward process. If I were to get stuck in one of the scenarios where there was no one available to help the next step would be online searches etc, which generally turn something useful up.
- If I have the time and resources peoople to ask I feel confident I can also access online help as well looking for clues.
- Need help regularly until I get the hang of it.
- This pattern looks very 'wimpy' and 'lazy' but the truth is I get frustrated very easily and the 'wasted time' does me in. I have high standards of myself and hate when things look unprofessional-i.e. I've just finished trying to 'build' myself a table using 'word'-it took me ages and as it looks unprofessional I think the information that I try to share will be pre judged by this! It's a bit like looking at someone's illegible writing with lots of mistakes- you have to look twice as hard to be impressed by the material.

Section D Personal Characteristics

In learning to use a new computer technology or on line too, I am more likely to ….

		Extremely unlike me	Unlike me	Neither like nor unlike me	Like me	Extremely like me	Total
... expect that I will experience many problems	n	1	3	3	3	1	11
	%	9.1%	27.3%	27.3%	27.3%	9.1%	100.0%
... doubt my ability to solve the problems that may arise	n	1	5	3	1	1	11
	%	9.1%	45.5%	27.3%	9.1%	9.1%	100.0%
... need to ask others for help	n	0	1	3	6	1	11
	%	.0%	9.1%	27.3%	54.5%	9.1%	100.0%
... try and persist on my own until it works correctly	n	0	3	3	5	0	11
	%	.0%	27.3%	27.3%	45.5%	.0%	100.0%
... give up quickly if it doesn't work	n	1	2	4	3	1	11
	%	9.1%	18.2%	36.4%	27.3%	9.1%	100.0%
... put a lot of effort into getting it right	n	0	2	3	5	1	11
	%	.0%	18.2%	27.3%	45.5%	9.1%	100.0%
... ask someone else immediately if it doesn't work straight away	n	0	3	5	3	0	11
	%	.0%	27.3%	45.5%	27.3%	.0%	100.0%
... get someone else to do it for me or fix it	n	2	5	2	2	0	11
	%	18.2%	45.5%	18.2%	18.2%	.0%	100.0%
... spend extra time trying to understand what to do	n	0	3	1	6	1	11
	%	.0%	27.3%	9.1%	54.5%	9.1%	100.0%
... get frustrated and annoyed at lack of progress	n	0	2	3	2	4	11
	%	.0%	18.2%	27.3%	18.2%	36.4%	100.0%

Comments

- Again I am always constrained by time and I have other tools and can adapt other tools to my needs generally
- Depends on mood at the time as to levels of frustration experienced with new things.
- I can get frustrated quite quickly because I usually only have limited time and access to the computer
- It does very much depend on what I am doing - what's in it for me. I persevered and conquered slideshare/slidecasts because I knew I would use it a lot. But I gave up quickly trying to get my head around camtasia because it was not a priority for me.
- Sometimes I do get annoyed at the lack of progress but do feel confident enough to find a solution either on my own or ask someone.

Overall Confidence

		Frequency	Percent	Cumulative Percent
Valid	Extremely unconfident	2	18.2	18.2
	Unconfident	1	9.1	27.3
	Neither confident nor unconfident	3	27.3	54.5
	Confident	3	27.3	81.8
	Extremely confident	2	18.2	100.0
	Total	11	100.0	

General Comments

- Computers are always going to present problems, as it is a constantly changing and advancing technology, but like anything, it behaves to series of rules which can be applied
- I am excited about learning new skills and feel more empowered to challenge the computer myself.
- I need to be able to process things over a period of time, I have found online social networking and collaborating is challenging because it can be so time consuming and sometimes it seems like there is not enough reciprocity. If I don't use it I lose it so I want to persevere and then apply what I have
- Whilst in the course of my work I do a lot of educating, I am not a teacher. And whilst I'm continually learning I'm not a student either, so I ticked 'both' to the question asking me if I was a Student or Teacher, as there was no alternative.

Appendix 15 - Individual case studies - two examples illustrating use of the case study template (with research feedback) - Results

Rita*: *Used emails, workshop notes, blogs, reflective cycle, pre and post-survey.

Project Objective A. Investigate how staff and students access, and interpret digital information creating their own understandings using purpose built modules which are customisable and Web 2.0 strategies.

What was the person's starting point in terms of their <u>knowledge/ skills/feelings or attitude</u> ….to of/in/about tools, techniques, social factors, learning etc	**Pre survey** "Feel well behind the ball park" "At times feel overwhelmed with it all" "I am rather determined though so if it is important I will not give up until I have it right, if not important I am likley to give up easily" **Workshop 1st "**Rita was so taken with the idea of becoming part of this online community she registered with Wikipedia and made her first contribution" **Blog 26 June "**Sometimes it feels overwhelming; passwords to enter, codes to break (a police state I thought, but R said it was to protect me!) sites going down, switching between screens etc….. It can feel like you are being caught up in a whirlwind" **Blog 26th June "**I like to have the	Rita felt that she was moving into situations where she needed to develop her DIL skills but she lacked **confidence** due to her lack of familiarity with and use of Web 2 tools. However, she uses search engines, library databases and email discussions on a monthly basis and is **confident** about these. Whilst not worried about making mistakes, Rita believes that learning to use new technologies is difficult and feels some discomfort about learning them. (Pre survey). At times this discomfort becomes overwhelming (Pre survey comment; B 26 June). Rita rates herself as being very **persistent** about things she considers important, but is not willing to put effort into solving unimportant problems. Despite her low **confidence** in using Web 2 tools, she showed early enthusiasm [**motivation**] and **risk taking**, registering with Wikipedia and making a contribution at the first workshop. Others in the workshop were astonished by her audacity (WN 1). Rita's learning preferences include: having an expert or teacher on hand to short-cut obstacles [**dependence**] (Pre survey comment; FG; B 1 July). She needs repetition to embed the new information/skill (B 26 June). She is also very goal/task-focused but thinks she may need to develop a different more reflective approach to learning new technology. Her comment is quite insightful "I need new ways of learning with this stuff, it is about process not outcome" [**recognition**] (B 26 June; "B 1 July). She would also like a structured printed guide to help with developing her DIL skills [**confidence/dependence**?] (B 1 July).

	end goal in my mind and then go back and start at the beginning to see how to get to the end. However, for this learning, it may not be the most useful process. I need to think a bit more about what I am doing" **Blog 1st July** "I have already commented that I need new ways of learning with this stuff, it is about process not outcome" **Blog 26th June** "I wish to repeat what I do several times in order to cement the new learning" **Blog 1st July** "Having an "expert" to answer the hard questions. Other classmates are useful to embelish and explain but I think there is always a role for a "teacher"." **Blog 1st July "**. I sometimes feel for me a hard copy of the "Dummies guide to Facebook" or the "Dummies Guide to podcasting" would be useful. I know it is all on the net but it is time consuming to find what you need."	
What was the person's goals in terms of their		1. To become proficient in using social networking tools such as Facebook 2. To be able to set up and use a blog

knowledge/skills/feelings or attitude ….to of/in/about tools, techniques, social factors, learning etc		3. To become more proficient in podcasting (receiving) 4. Although not stated as a formal goal, Rita identified quite early that learning the process was more important than the outcome.
What did the person do to achieve their goals?	**Action research cycle**	Goal 1 social networking. 1. Discussed social networking tools with others in the workshop (Facebook, beebo, twitter) 2. Explored social networking sites, discounted twitter 3. Set up a Facebook account and used for several weeks, concluded it to be of little personal value but useful as a site for her students Goal 2 Setting up and using a blog 1. Discussed the concept of blogging with the workshop group 2. Experimented with Blogger.com, Mahara, and Google groups. Choose Blogger as the most simple 3. Set up blog and continued to use for several weeks Goal 3 Understanding and using podcasting 1. Discussed with the group: podcasting, RSS feeds, different forms of podcasting – audio, video and text 2. Looked it up on Wikipedia and YouTube 3. Downloaded a podcast to her computer 4. Set up RSS feeds on home and work computer Although focused on her own goals Rita spent time helping others. In particular she spent a lot of time helping C with her powerpoint. She was not herself familiar with it but working together they made progress. She also helped R with her Mahara portfolio (B 29 July; WN)

What did the person learn in terms of their knowledge/skills/feelings or attitude ….to of/in/about tools, techniques, social factors, learning etc	**Action research cycle "**(success at this) has made me more comfortable exploring other tools eg Skype" **Post survey** "More confidence, know where and how to get answers… Much more confident, feel as if I know what is going on" **Post survey "**Having answered as above, although my personality hasn't changed over the 10 weeks, the significant change for me is giving it a go, knowing the answer is there if I take time to read instructions slowly and call in an expert when needed. But more likely to leave it longer before I call in the expert and more likely to spend more time on the task before I give up" **Post survey** "Termnology is not so scary"	Achieving her three goals has given her **confidence** to explore other related tools and how to **access** information (RC; Post survey comment). Her engagement with Web 2 tools has gone from mainly never used to use at least once a week for many of them Post survey). Rita stated early she believed this was about process and her post survey comment ".., know where and how to get answers" suggest that this belief guided her learning process. Rita change her attitude to the benefit of collaborative learning over the teacher/expert model: "I had the expectation that you Lynn, were the expert and I actually found that quite hard and thought after two weeks I have had enough of this. I like to go in and get maximum input so it was actually quite a switch psychologically for me to say this is a different way of learning and now it feels, on reflection, it is a much better way of learning than just having one person having the knowledge" (FG). Rita is now more willing to take **risks** ("give it a go"), **believes** she can solve DIL problems with the right approach ("knowing the answer is there if I take time to read instructions slowly") and is more likely to **persist** (**"**more likely to leave it longer before I call in the expert and more likely to spend more time on the task before I give up") (Post survey comment). Rita explored and became familiar with several online tools including social networking tools (Facebook, Beebo, Twitter), e-portfolios (Mahara), online notes (Google notes, Onenote), podcasting and RSS feeds, Outlooks calendar and meeting functions, Youtube, Wikipedia, wikieducator, Del.icio.us and Blogs.
Did the person achieve their goals?		Yes Rita achieved her three stated objectives in that she set up and used the tools over a period of time and became confident in her ability to use them and to subsequently explore and use other Web2 tools – which was her fourth informal goal.

Project Objective B. Ascertain how personal online learning environment and membership in a social networked community can influence digital information literacy.

Specific questions to address this project objective:

Change(s) in K/S/A? Identify enablers/barriers in terms of: • individual factors (personality, motivation, etc...) • environmental factors (social, physical etc...) • activities/processes undertaken (structure, etc..)	**Barriers** **Blog 10th July** "One frustration trying to learn, all this at home is that my home computer is not up to speed with where I need it to be so it limits many activities. If the Government are looking at people using new technologies this is major factor in engagement." **Workshop 18th July** "…really need the right equipment for working on the web." **Workshop 25th July** "One of the frustrating things is that the computer lab computers have not been set up to achieve what we want to achieve. Such as podcasting." **Blog 10th July** "Sometimes it feels overwhelming; passwords to enter, codes to break (a police state I thought, but Rachel said it was to protect me!) sites going down, switching between screens etc" **Workshop 11th July** "Felt frustrated at passwords and bumping into things she didn't understand." **Enablers** **Blog 10th July "**I have looked on Youtube to see I can get a video on downloading free music so will bring a CD to next session and try it"	**Barriers** A major barrier for Rita was not having the right level of technology to do what she wanted. Eg. difference in level of technology at home and at work can cause frustration (B 10 july; 18 July). Uni computer labs also had some restrictions that were frustrating (B 25 July) Rita was frequently frustrated by jargon and inconsistent logon/registration/password requirements "I have given up on Facebook, a hassle with passwords etc, I don't understand the whole thing, have walls, emails, adding friends, etc to cope with. I did add an event though to my page! But it is all drivel so I am not interested in pursuing this even though I was so excited by it at the beginning" (B10 July; WN 11 July) **Enablers** As Rita learned new tools, they became instrumental in helping her solve other problems of learn more about DIL [**technical aptitude**] for example she learnt about podcasting by reading Wikipedia (RC), and how to download free music from Youtube (B 10 July). Rita initially becomes discouraged but **persisted** to achieve her objective

	Blog 29th July "Kept up with Facebook and discovered it is quite useful as my neice and nephew suddenly appeared on them!!" **Action research cycle** "Understood podcasting by reading Wikipedia" **Blog 10th July "**Last Friday we tackled Mahara and I made good progress until we came to adding a blog to it, gave up at that point and left it to Anil to work out the solution and give it to me! ……..I have given up on Facebook, a hassle with passwords etc, I don't understand the whole thing, have walls, emails, adding friends, etc to cope with. I did add an event though to my page! But it is all drivel so I am not interested in pursuing this even though I was so excited by it at the beginning……**Blog 29th July** "Kept up with Facebook and discovered it is quite useful as my neice and nephew suddenly appeared on them!!" **Blog 10th July** "I am now more confident that I can find the basic information on everything I need on the computer and at least give the basics a go. I am also more confident at work now like trying things in Word" **Blog 29th July** "During the week my son wanted to go onto an on-online chess site and was confused by all the signing on etc so I was able to say with confidence "you need to set up an account first"-would never have known that 6 weeks ago!" **Blog 29th July** "Learning is incremental but progress is getting made, don't feel I am on the outskirts of technology any more."	Increased **confidence** in DIL matters

	Workshop notes 25th July "Referred back to G's comments in previous weeks of 'zoning out' when the conversation turned to IT matters and described how the previous evening people had talked about broadband and she felt quite comfortable joining in. It didn't seem so scary anymore." **Blog 17 July** " Interesting how I am becoming more confident with the computer, realising I can find most of the base information on the computer and it isn't as daunting as I first thought. … Interesting that G was talking about how she no longer switches of when people talk computers. Had in interesting discussion about Broadband last night so have more understand about that little **Workshop 18th July "**What happened is the growth in confidence and feels that if needed to find something out able to have a good go at finding out about it and probably getting about 80% of the information needed. Other 20% might need to ask someone." **Blog 29 July "**Last week R showed me how to work on Calender and then today showed me how to drag emails into it, all very clever…. Shown how to put my RSS feeder on the computer. Sometimes it just feels as though you are just going with the flow without really understanding what on earth you are doing! Sometimes I think you need to just get help setting up the framework and then you can just get on with what matters. Interesting how much we rely on A in the group, he doesn't mind though!" **Post survey** "you don't realise till the end, the value of collaborative learning, it moves slower than having a	For Rita active **engagement** decreased the obstacles, increased **confidence** and **motivation** resulting in further engagement. Rita experienced times of frustration and moments of wanting to give up. However, she **reflected** on these feelings and made a conscious decision to tackle the problem head on. She made herself go back online and worked on each of the areas in which she was experiencing problems [**persistence**]. They yielded to her more considered, slower approach (B 1 July). Realising that the answers are there to be found has increased Rita's confidence, as has being able to show her new knowledge in other contexts such as helping her son sign up to an online chess site and getting more involved in social discussion on DIL issues (B 17 July; WN 18 July)). Rita showed a willingness to help and **seek help** from the first workshop. Although she enjoyed learning this way, for a long time she felt having an 'expert' on hand was really important. By the end of workshop she had come to believe that the collaborative approach is better ("you don't realise till the end, the value of collaborative learning, it moves slower than having a teacher but with this method you can ask what you need to know/learn as opposed to what a teacher thinks you need to learn." Post survey comment). Rita has developed a strategy for dealing with DIL problems ""But I realised that it is all not as daunting as it was at the beginning, now if I wanted to find something out I would go to Youtube first to find out what to do, have a go, ask an expert to help and then I reckon I would have it sussed!" B 14 August). [**technical aptitude**]

	teacher but with this method you can ask what you need to know/learn as opposed to what a teacher thinks you need to learn." **Blog 14 August** "But I realised that it is all not as daunting as it was at the beginning, now if I wanted to find something out I would go to Youtube first to find out what to do, have a go, ask an expert to help and then I reckon I would have it sussed!"	
No change(s) in K/S/A? Identify in terms of: • individual factors (personality, motivation, etc...) • environmental factors (social, physical etc...) • activities/processes undertaken (structure, etc..)		

Project Objective C. Indicate how important digital information literacy is for lifelong learning of staff and students (including Maori and Pasifika), productivity and innovation.

Specific questions to address this project objective:

Intention to engage with DI, tools, use of words productive, efficient, effective, innovation. write a brief statement that summarises these aspects and combine with quotes where appropriate.	**Action research Cycle** "Likely to continue using it (Facebook) for my students, primarily for adding events and photos. Could be useful for contact with nieces and nephews when travelling." **Workshop 8th August "**Somebody emailed us who had left work and told us she was on Skype and I thought oh yes. So there's that sort of thing. I'll find the email today and find out more about Skype because I don't really know much about it."	Rita intends to keep using Facebook for her students and for contact with her extended family. She will continue to use podcasting, though has some reservations about having time to listen to it all (RC) She intends to investigate and use Skype (B 8 August). **Summary** Rita started with a burst of enthusiasm and excitement but also felt low in confidence and competence. She was very reflective about the process and discovered a great deal about her own learning style and attitudes to technology. She found that she needs to take small considered steps rather than rushing too much. She has learnt to be more persistent and that learning by doing is very effective for her. She has also developed her own strategy for solving technological problems. In other social and work contexts she finds that she is more interested in taking part in technological conversations. As her engagement with technology has increased so has her confidence and belief in her ability.

Valerie: Case study using the template

Project Objective A. Investigate how staff and students access, and interpret digital information creating their own understandings using purpose built modules which are customisable and Web 2.0 strategies.

What was the person's starting point in terms of their knowledge/ skills/feelings or attitude ….to of/in/about tools, techniques, social factors, learning etc	Valerie started project **evaluated** herself as average user of technology for information literacy, being aware [**recognising]** that there is an increasing expectation of her, which meant she needed to further develop her DIL (very much so). *"A lot of it is I wanted to learn these things because I know people are going to be asking these questions so it's always better to answer than not"* [FG] Being an average user [**technical aptitude]**, Valerie had before the project created wikis, blogs and used Audacity and Camtasia to create learning resources. Only a few of the survey listed tools were ones that Valerie had never used (ie Google books, and Google docs, slideshare or Facebook). Valerie was a weekly user of Internet search engines, wikis, email discussion groups, with the balance of listed tools having been used at least once, and others more than once a month. Valerie rated herself as a **confident** user of Blackboard, discussion forums, software to create webpages, and extremely **confident** user of websites for reading/searching, computer apps, and email. For databases, blogs, email discussion groups and wikis, Valerie was **confident** or very **confident** with a pattern of use (either less than 1x month, or at least weekly). Usage and confidence appeared linked with purpose for Valerie*"I have used some of these media once, I would like to use some more often… but lack confidence and a purpose"* (Presurvey quote). Valerie was not confident in using online chat, computer conferencing, audio or digital formats. Valerie's feelings or attitude towards technology is mainly positive, she feels confident, at ease learning, and not worried about making mistakes [**engagement]**. However, she still thinks that learning to use the tools is not easy, suggesting a slight hesitancy about the learning process. *"When I began learning to use online tools I didn't like making mistakes but I feel that I have managed to get over this"* [**self-evaluative]**. (Presurvey quote). Valerie use a range of strategies to learn a new tool, **reflecting** on what works and doesn't for her. "*I often find that sometimes given enough time I can work it [out]to some degree, but I do appreciate being able to see it being demonstrated and discuss it. This covers all the seeing, doing, hearing, learning styles" (*Blog entry May 30th) Valerie rates herself at unconfident only if she had an instruction manual for reference. Time is a factor, with Valerie being extremely **confident** if she has a lot of time to learn (precourse survey). Valerie is likely to

	persist, to use others [**information seeking]**, but also to persist on her own, and is unlikely to give up or get someone else to do the task for her. In **evaluating** herself, *"Sometimes I do get annoyed at the lack of progress but do feel confident enough to find a solution either on my own or ask someone" (*Presurvey quote). Overall Valerie describes herslef is a **confident** user of ICT, using **logic** and **inquiry** to find out and about and use tools.
What was the person's goals in terms of their <u>knowledge/skills/feelings or attitude</u> ….to of/in/about tools, techniques, social factors, learning etc	Valerie's goals were to create multi-media resources that would better meet the diverse learning styles of her learners. Currently she could demonstrate a skill, or provide them with a written handout/guidebook, but Valerie was keen to explore other options. This goal came from Valerie's knowledge of the difficulties her students had with using only paper based workbooks to learn how to use computers. **[recognition** of a need, **motivated** to address**]** Although not a goal at the beginning of the project, Valerie also achieved a goal of setting up a Google group for a SLWP that she was a member of. This was a new task for her, showing **flexibility.**
What did the person do to achieve their goals?	To achieve the goal of having multimedia resources, Valerie explored Moviemaker, Camstudio and Camtasia. Valerie trialled each one evaluating each against her own criteria of easy capture, editable, and consisting of compressable files [**logic and inquiry]**. She learnt the skills of recording and editing, and determining the best file format (swf files) (AR cycle) [**engaged,** demonstrating **curiousity]** To achieve the goals Valerie used a number of strategies. She asked others [**information seeking]**- *"Anybody who stood still long enough really. In those workshops it was anybody that was available to help*"[FG]. Valerie also played around a lot on her own [**risking taking]**. *"I just click here and what happens and oops that isn't what I wanted, so I do a lot of that and I find that quite helpful. You learn something every time you go around and around the menus"*[curious self-directed] [FG]. Playing a lot on her own *"gave me more confidence in actually using it and when I came to a problem, instead of just giving up I was trying to work through until I found the solutions"* [FG]. Valerie also acknowledged that *"I wouldn't have necessarily given up, I probably would have put it away and not gone back to it in a big hurry".* Although confidence building, play was time consuming. It was quicker to ask [FG]. I am missing a step and I can't seem to get it right, I need some human intervention." [**information seeking]** [DILOP group] Valerie liked being with others [**sharing]***"group was diverse and that is interesting to see other people learning"* and "*it really gave*

	me a sense of the community, but also that other people were interested in the learning because that is a motivator on a different leve [blog]*.. listening to other people talking about I need to learn this"* [FG]. "*Everybody doing something different added to my knowledge"* [FG, blog].
What did the person learn in terms of their <u>knowledge/skills/feelings or attitude</u> ….to of/in/about tools, techniques, social factors, learning etc	Knowledge: Valerie **evaluated** her preworkshop blog – *"So I had to go back and look at what I had done and I thought it was pretty dumb really, pretty boring , so this time I tried to add more to it, I tried to access more things and create a bit more of an interesting environment"* (FG). She also increased her knowledge of tools she could use – "*last year I had never heard of a blog, this year I had a bit more information behind me and a bit more understanding too"* (FG), and Valerie said: *"I like the technology that is available and the applications that blogs can be used for"* suggesting an increased understanding [**technical aptitude].** Skills: Relearning to use camstudio, learning about camstudio, Learning how to use wikis – editing basics, and copying code Uploading videos from YouTube, adding images from Flickr, exploring use of moviemaker as place to store audio/video, exploring how to add video files to word press blog, how to use slideshare. Attitude: Valerie gained insight into what she was prepared to share online *"so I was always conscious of what I was saying because sometimes it is not just like putting your ideas out there, you have to really think about what you are going to say before you actually do it. I found that not difficult but just time consuming."* (FG) Valerie expressed her **beliefs** as part of the first workshop "*I am more concerned about the ease that the Internet and web 2 technology seems to be taking over our lives at an increasing rate"*[blog]. In working out what to do by herself or with following help instructions, Valerie did experience a feeling of increasing competence *"Well I managed to do that now I will try adding an image once again from flickr. I managed to do that so I'm feeling a little bit more competent around blogs"*[**reflection]**
Did the person achieve their goals (set or not set)?	Valerie's goals were mostly achieved, in that prior to the project starting Valerie had **recognised** a need for which she was not clear what would be the best solution. Valerie showed **curiousity**, and a willingness to **risktake**, in order to achieve her goals. Valerie had a **strong belief**, in her ability to find a solution, and **persisted,** using strategies that work for her [**self-evaluate] – information seeking/interacting.**

Project Objective B. Ascertain how personal online learning environment and membership in a social networked community can influence digital information literacy.

Specific questions to address this project objective:

Change(s) in K/S/A? Identify enablers/barriers in terms of: • individual factors (personality, motivation, etc...) • environmental factors (social, physical etc...) • activities/processes undertaken (structure, etc..)	<u>Skill</u> Valerie's **evaluation** of her digital technology skills for finding and using information [**access]** had increased by the end of the project from average to high by the end of the project **[technical aptitude]**. Valerie increased usage of new tools. Those which she had never used such as slideshare or used only a little, Valerie was using moreby the end of the project. Valerie's **self-evaluation** was that she either increased her usage, or that she would like to use more often than she had done previously – eg Slideshare. This suggests an increase in **engagement,** and in line with her comments would suggest that she had found a purpose for exploring which may have assisted her confidence (previously a barrier to **engagement**). This increase in **confidence** in using a range of tools was reflected in her self-**ratings** in that tools she was confident using before (online library databases, Internet search engines, blogs, email discussion groups and wikis stayed rated at either confident or extremely confident), whereas those where she had been extremely unconfident, were rated at neither confident or unconfident, and those that she had been unconfident moved to neither confident or not confident, or to confident. For Valerie it appears that exposure, and persistence has allowed her to feel more confident to try herself. Tied in with the need to find a purpose, Valerie states "*I have become more confident using Internet tools such as flickr, youtube, slideshare. I can see useful applications for these".*[postsurvey] Development of skills was key for Valerie - *It is easy but it is complex if you haven't got the computing skills to navigate your way around what is in that, it can be really difficult but I found it easier because I had already done it once".* [FG]. One of the barriers for Valerie to use of digital tools was finding a strategy for keeping track of her usernames/passwords [lack of **systematic** finding of a **solution].** <u>Knowledge</u> Valerie valued the knowledge of the group, **information seeking**, *"Thanks its brilliant to be able to ask a question and get such a great response."* [DILOP group]. For Valerie it appears that exposure, and **persistence** has allowed her to feel more **confident** to try herself. Tied in with the need to find a purpose, Valerie states "*I have become more confident using Internet tools such as flickr, youtube, slideshare. I can see useful applications*

	for these".[postsurvey] <u>Attitudes</u> At the end of the project, Valerie no longer felt anxious about using tools, nor uncomfortable. However, she still expects to experience problems, and to possibly need to seek help from others. Levels of frustration and annoyance at lack of progress also appeared to be lessening.
No change(s) in K/S/A? Identify in terms of: • individual factors (personality, motivation, etc...) • environmental factors (social, physical etc...) • activities/processes undertaken (structure, etc..)	Reflective of Valerie's comment in her presurvey that she did not expect learning new tools to be easy, was an experience Valerie had when attempting to use Wikieducator as the source location for student guides. In workshop 3, Valerie tried uploading files, but an issue with the website resulted in her needing to regularly change her username/password. Comment from workshop notes *"Something which she can do by other means in a short period of time is taking her hours and is 'doing her head in' ". "They should make a task easy, but sometimes they don't"*[postsurvey] and *"I find that there needs to be a reason and purpose for me to go to the time consuming trouble to ind solutions"* [post survey]..

Project Objective C. Indicate how important digital information literacy is for lifelong learning of staff and students (including Maori and Pasifika), productivity and innovation.

Specific questions to address this project objective:

Intention to engage with DI, tools, use of words productive, efficient, effective, innovation. *write a brief statement that summarises these aspects and combine with quotes where appropriate.*	Valerie states in her postsurvey on completion of the project "*I would be more likely to explore online tools and see if they are an answer to my problems".* She believed that her experiences in the project though were useful, in that she had found some of what she had achieved challenging – *"Sometimes even though I knew they were speaking English it* *still sounded like a foreign language to me"* (DILOP group). *This is why I feel fully* *qualified to show others how to blog the memories are still fresh*.