

EMBEDDING TECHNOLOGICAL LITERACY: A STRATEGIC UNIVERSITY WIDE APPROACH

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Abstract

Technological literacy, along with other key literacies, is now an essential attribute to successfully participate in higher education and in the workplace. The Queensland University of Technology is taking a strategic approach to the acquisition of technological literacies, funding a two year collaborative, interdisciplinary initiative, The Technological Literacy Project, Building a Foundation for Flexible Delivery.

The project seeks to improve students' technological literacy, by developing web based resources and strategies which enable academic staff to 'infuse' the acquisition of technological literacies into their courses. This approach complements existing QUT initiatives, such as faculty-based programs, centrally offered training and help desk services, and furthers other institutional goals such as increasing flexibility in teaching and learning, and developing generic graduate capabilities.

This paper reports on the outcomes of the project to date, specifically the development of a suite of web-based resources to facilitate the acquisition of technological skills and the findings from a series of surveys of academic staff and students, identifying computer access and usage patterns and assessing technological dispositions and skills. In addition, the paper discusses new participative models for resources development and newly emerging strategies to engender individual and institutional commitment to the concepts embedded in technological literacy.

The development of technological literacy resources, including the resource bank, templates and case studies, has drawn on a diverse range of skills, knowledge and understandings of QUT staff from academic, library, technical and professional development fields. The development process is seen as an evolutionary one, and at the time of writing, the resources are considered to be prototypes. Consequently there continues to be a strong commitment to evaluation and one of the important findings of the evaluation has been the broad ranging and ongoing needs for professional development for academic, technical and support staff.

In this latter stage of the project, a key role for the team is to identify the appropriate strategies which will ensure ongoing commitment to technological literacy at all levels of the university, to engender new ownerships of the resources and of the processes established by the project and to facilitate the transfer of many of the project's activities to new coalitions and relevant areas within QUT.

Keywords

Technological literacy, strategic planning, staff development, web resources

1. Introduction

President Clinton, in his “Call to Action for American Education”, described technological literacy as “a new basic that our students must master”(US Department of Education, 1997). There is similarly an increased awareness within Australia of the needs for students to be technologically literate, as expressed in the ‘Goldsworthy Report’” (Information Industries Taskforce, 1997, p.79), which noted that “all tertiary graduates should be information and communication technology literate in their chosen fields of study and expertise by the year 2000.

Within the higher education sector there is, for various structural and pedagogical reasons, an expectation that staff and students will become technologically literate, although perhaps less understanding of what being technologically literate entails. Technological literacy in the post-secondary sector can be said to include the “skills, conceptual understanding and dispositions which enable students to effectively use physical and information technologies for academic, research and vocational purposes”. (Perkins, 1993, Dyrenfurth, 1991) It is also one of the three key literacies required for students to develop transferable lifelong learning skills, the others being information and academic literacy.

As universities restructure, larger class sizes and other "efficiencies" are introduced, with newer information technologies often seen as playing a significant role. These technologies are also seen to offer opportunities for more effective, lifelong and self-directed learning. With universities increasingly adopting flexible delivery options that include technology, staff and students must be appropriately equipped with basic skills so they can fully participate in and effectively make use of technology and the resources technology allows them to access.

2. Project background

The Queensland University of Technology is seeking to address many of these issues through a two year initiative, the Technological Literacy Project, Building a Foundation for Flexible Delivery, funded by the university’s Large Teaching and Learning Grant Scheme. The Technological Literacy Project has built on the findings of a smaller 1997 project which provided the ‘proof of concept’ for the larger initiative and identified a number of factors related to the diverse nature of students technological skills, experience and computer usage patterns.

There are a number of strategic aspects to the Technological Literacy Project, in particular its collaborative nature and its close alignment with key objectives identified in the Teaching and Learning section of QUT’s Strategic Plan. The project is a joint initiative of the Faculty of Arts, the Faculty of Education, the Faculty of Information Technology and the Division of Information and Academic Services, and draws, therefore, on a wide range of knowledge, experience and expertise from both academic, professional and support staff. This strong collaborative ideology not only guided the composition of the project team (comprising academic and professional staff with strengths in teaching, research, development and use of communication and information technologies), but also influenced the methodology of the project and the way in which key activities were conceived and undertaken. The development and evaluation of the technological literacy resources, for example, and the research and evaluation which underpinned these processes, has involved over forty staff from six faculties and the Division of Information and Academic Services.

Technological literacy, and the various skills and concepts embedded within, is seen as an essential foundation block for a number of institutional goals identified under the University's Teaching and Learning Plan 2000 – 2004, especially those related to increasing flexibility in teaching and learning (Objective 1, Strategy 1.1 and 1.2) and to developing graduate attributes (Objective 2, Strategy 2.1). The University's Manual of Policies and Procedures, for example, under the section dealing with Generic Attributes of QUT graduates states that all graduates 'should be able to use current technologies to advance their own learning'.

The project, therefore, aims to further a number of the University's key goals and strategies by:

- enhancing the university's capability to provide flexible teaching and learning options,
- assisting the development of generic graduate capabilities,
- developing resources which have university wide application for teaching, learning and strategic planning purposes.

To this end, an integrated and systemic approach has been adopted by the team, working with lecturers, managers, administrators, students, librarians, instructional designers, technical and support staff. The project origins grew from a grassroots need to support lecturers who were trying to improve students' technological literacies. Since then, the project team has sought a balance between a 'bottom-up' and 'top-down' approach to the development and implementation issues. We have continued, for example, to work co-operatively with lecturers and support staff (especially with staff from the Software, Multimedia and Internet Learning Environments) to complement or enhance existing programs, as well as to develop new resources. At the same time the project team has been conscious of the need to inform and liaise with the senior executive and appropriate university and faculty committees with respect to our progress and matters of institution-wide significance.

3. What we've done

The overall aim of the project is to improve students' technological literacy indirectly, by providing tools and strategies which enable academic staff to "infuse" the acquisition of technological skills and conceptual understandings into their units or subjects. At the time of writing the project team has fulfilled a number of its aims by:

- conducting a series of environmental scans by surveying academic staff and students to identify students' computer access and usage patterns and assess their technological dispositions and skills,
- creating a web-based resource bank of materials to facilitate the acquisition of technological skills,
www.olt.qut.edu.au/int/litkit
- developing templates for lecturer use, to facilitate the integration of technological literacy into teaching and learning programs,
www.olt.qut.edu.au/int/litkit/Templates/

- developing case studies and exemplars for academic staff (initial stages of development)

In addition, the project team is beginning to formulate a number of strategies to engender individual and institutional commitment to the concepts embedded in technological literacy. These are discussed in section 4 of this paper.

3.1 Environmental scan of technological literacy

Surveys of both staff and students were undertaken over the period 1997-1999 to collect demographic and other information which could be used to:

- provide data for benchmarking purposes
- inform decision making across the university, at an institutional, faculty and individual level, and
- inform the development and updating of the LitKit resources.

To date, three student surveys and one staff survey related to technological literacy have been conducted within QUT. Surveys of predominantly beginning students from several faculties were carried out in the first few weeks of semester in 1997 (700 students); 1998 (514 students) and 1999 (1160 students). The survey questions sought information about student demographics, computer access and usage patterns, as well as asking students to self-report on computer skills and broader technological literacy competencies, attitudes, learning preferences and patterns.

Findings from the surveys indicated, for example, the number of students with access to a computer away from the university was increasing: 80% (1997), 86% (1998) and 88% (1999). Furthermore, with respect to Internet access away from the university a dramatic 19 % increase occurred between 1998 and 1999, with 66% of students reporting they have access in 1999. Reflections on how students learnt about computers were especially revealing, for while 57% had previously learnt most about computers informally, only 23% indicated that they preferred to learn it this way, the majority reporting that they would rather more formal or structured modes.

This data is proving to be invaluable not only with respect to the development of project resources, but also in terms of informing the university's decision making and strategic planning processes, as flexible and other technology-based forms of education are gradually embedded in mainstream practice.

An academic staff survey (109 respondents) was conducted in 1998 to establish what perceived importance staff placed on students' technological literacy. Some of the critical findings indicated that staff surveyed saw technological literacy as essential in undertaking university studies and as a generic attribute for all QUT graduates. This supported both the current institutional strategic direction with respect to graduate attributes and the project team's assumptions about the ongoing importance of technological literacy. There were, however, wide-ranging staff views about the competencies of students - especially school leavers - in relation to essential skills such as word processing and Internet-related skills such as communication and information searching, with many believing that QUT students were 'computer

literate'. Interestingly, this was not supported in general by the student surveys, where for example in 1999 only 44% of students reported that they were able to manage computer files effectively. In addition, 93 % of staff surveyed believed that all students needed to know how to effectively search and retrieve information from the Internet, and yet only 50 % of students in 1998 reported that they were confident to do so.

The staff survey revealed another crucial finding – that when asked a basic question about their preferred way to assist students acquire technological literacies, only 53% supported an 'integrated' approach. This figure climbed to 75% when asked if they favoured such an approach if appropriate resources and support structures were available to assist them. These findings align with the more recent qualitative data collected as part of the evaluation of the project's web resources, which revealed that students were more enthusiastic about using online tutorials when academic staff provided the framework and rationale to do so. Generally, this view contrasted with that of those who were, for example, 'walk in' users in a library resource area and had used the tutorials in a stand-alone, discipline neutral context.

3.2 *Web-Based Resource Bank*

A portal site, providing a collection of annotated and categorised web-based resources called "LitKit", was established for use by both lecturers and students. The resources are grouped under functional headings: Finding, Communicating, Studying, Using and QUTing.

Each site is annotated to assist both staff and students in selecting relevant resources for use either in the classroom or for self-directed study. A protocol for the annotations has been created to facilitate the contribution process and to ensure both consistency and quality of information.

The protocol includes:

- a description of the content and location of web site (or other resource)
- the purpose
- the scope
- the primary audience
- the context of use

The resource bank is premised on ongoing contributions of useful sites and annotations by staff, to ensure the information is up-to-date, relevant and useful. Feedback from staff and students, and reports in the current literature, indicates that annotations and contextual information about a site provide the vital clues and background which enables users to assess the value of a resource and ultimately to determine whether the database search process has been worthwhile.

To date, the web site has largely been used by lecturers and students on an ad hoc basis, but from early 2000 it is expected to be used more widely when integrated into another key QUT strategic initiative, the On Line Teaching Project.

3.3 *Templates*

A series of on-line web based templates have been developed to provide a framework for lecturers wishing to follow a structured path when teaching particular technological literacy topics. The four template topics cover clusters of technological skills and understandings, identified as key areas through the literature, surveys and expertise of the project members. The current templates, targeted at a fairly basic level, are:

- Finding Relevant Internet Information
- Communicating via Computers
- How a Computer Works
- Creating and Presenting Text

Possible future topics include developing web pages, statistical analysis, databases and more advanced levels of the current templates. All templates have been developed so discipline-specific examples or information can be integrated into the template, allowing students to learn the particular topic within the context of their discipline and within the framework of a particular unit.

The first two templates were trialed during Semester 1, 1999, “How a Computer Works” was established in prototype format at the beginning of Semester 2, and the fourth template is ready to put on the web subject to funding.

Extensive evaluation of the templates, presented to students as online tutorials, has been carried out by the project team through surveys, interviews and focus groups. In general, it was found that students gained more from the online tutorials in the ‘integrated’ rather than ‘stand-alone’ mode. In other words, when the rationale to acquire specific literacies was provided in the context of a unit of study, particularly when combined with discipline specific examples and assessment, students appeared to be more motivated and reported more positive learning outcomes. As expected, the evaluation process revealed many other specific comments about various aspects of the online tutorials (technical, content and creative), such as the helpfulness of glossaries, the need to provide greater structure or navigational hints in places, and possible ways of building self assessment into the tutorials. The team is currently assessing how such feedback can be usefully incorporated into the template development process.

Some of the most revealing insights, however, related to the human dimensions of using online technologies, as evident in the following comment from a 1st year student who had worked through the tutorial on computer mediated communication (CMC),

CMC is extremely convenient as it allows students to access it at any time ... The second reason I find CMC an excellent option is because it is comforting. Perhaps this is a lame reason, but it is nevertheless a strong one in my mind. It is a support network – or a place I and other students can turn to when we need to learn something or assess where we have gone wrong.

A number of students appreciated the ability to use the tutorials for revision, especially when they found they were ‘stuck in the middle of night’ and couldn’t recall how to do something such as send an email attachment. Off-campus students in general were very supportive, but again reported the need to have the subject or discipline context provided beforehand. These findings are being used to inform development of future templates and to improve existing ones.

Perhaps the two most significant issues which have emerged from the evaluation process are:

- the need to have a co-ordinated ‘whole of course’ approach to the acquisition of technological literacies by students throughout their degree
- the need to establish a balance between a generic template and template which accommodates sufficient discipline specific information and content

These issues are explored further in the latter part of this paper.

3.4 Case Studies and Exemplars

The aim of the case studies and the exemplars is to give academic staff a feel for the contextual, implementation and real life issues involved in the use and integration of resources, complementing the information provided by the annotations in the resource bank. The case studies, which are in the initial stages of development, hopefully will highlight rich experiences (positive and negative) and tease out a range of narratives, stories and anecdotes. Exemplars, on the other hand, can act as “good practice” guides or examples and are designed to help people move from one set of teaching philosophies and practices, such as “I don’t want anything to do with teaching technological literacy”, to a new approach, such as “I’d like to integrate the teaching of email communication skills into my unit”.

4. What we’ve learnt

Involvement from staff across faculties and divisions was a key strategy, not only to gain different perspectives on issues, but also to foster widespread commitment to and a sense of ownership of the project. The consultative approach has in many ways been time consuming and has slowed progress from an efficiency point of view, but it was essential to nurture common understandings and to avoid the pitfall of producing excellent resources which are rarely used beyond the life of the project. Furthermore, the process has yielded invaluable insights into alternative and complementary ways of developing new resources in interdisciplinary team environments, knowledge that can be shared and transferred to new development environments.

4.1 Exploring new models for development

The project has been premised from the outset on the development of generic resources which can be adapted for specific purposes and on the ongoing input from and commitment of staff from a diverse range of backgrounds and IT experience. Both these goals have presented challenges to the project team.

The template development working teams, for example, have grappled on a conceptual and practical level about how they might produce a set of common templates or a generic framework of sufficient detail to be useful, but with inherent flexibility and options to enable staff to adapt it easily to their own requirements. The discourse has centred on issues related to the language used in the templates, as well the content. The concept of producing generic teaching resources is a timely one for universities, but a satisfactory outcome requires ongoing and close collaboration between academic, technical and design staff.

As with other similar projects, the training and development needs of academic, professional and support staff and the need for appropriate recognition for staff contribution to such initiatives, has been highlighted. While the project team was successful in obtaining some funding for this purpose, much of the 'production' time which originally the team anticipated would be devoted to the development of online resources, in fact has focused on broad staff development issues. The development of the templates, for example, has not followed a well mapped or efficient process, but it has, and continues to generate rich insights into a collaborative interdisciplinary development process and especially into issues relevant to late adopters or '2nd generation' technology users.

4.2 Strategies to Embed Technological Literacy

The research findings, feedback from other staff and students and the experience of the project team will be used to develop strategies to promote and embed technological literacy. Many of these strategies are still taking shape as the project team synthesises the wealth of data collected over the past eighteen months. The overriding strategy, however, is to develop a systemic and sustainable approach by:

- Promoting throughout all levels of the institution continuing support for and dialogue about the pedagogical and strategic importance of technological literacy, and in particular, identifying and exploiting from an institutional perspective the synergies which exist between technological, information and academic literacies
- Maintaining academic input and commitment to students' acquisition of technological literacies by encouraging staff ownership of and involvement in the development and evaluation of LitKit resources
- Developing a 'whole of course' (including double degree courses) approach to the student acquisition of technological literacy, rather than a one-off or ad hoc approach which may be subject to individual preferences and abilities of academic staff
- Strengthening collaborative approaches within the professional support areas (technical, academic staff development, library, student support, instructional

design) who may be responsible for the ongoing maintenance and development of technological literacy resources

- Continuing data collection to ensure current and accurate information about students' computer access, usage and needs informs decisions about facilities, support and curriculum
- Highlighting technological literacy as one of the essential graduate attributes, encouraging students to view it as a key lifelong learning strategy and exploring ways they can assume a greater role in their own development.

Conclusion

The team is confident that the project goals will be realised, but we are keen to explore the many ways that the initiatives and resources set in train throughout the life of the project can be sustained by key professional service areas within QUT and mainstreamed into teaching and learning practice. The realisation of longer term benefits from this project, however are largely predicated on a number of factors including:

- the continued championing, support and provision of resources for literacies programs and resources by senior staff, and
- the development of a system-wide and collaborative approach to enhancing not only skills, but also the conceptual understandings which underpin skills acquisition, on the part of all constituents – students, academic and support staff.

These are challenges facing the project team in the concluding stage of the project.

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