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From smorgasbord to satisfying meal: An holistic approach to information literacy and lifelong learning

Abstract

Educators have long recognised the potential offered by technology as a tool for learning. However, there have been few attempts to provide teachers in the classroom with a framework that assist them to embed technology into curriculum programs in a pedagogically sound manner. This paper details the development and implementation of a module of online curriculum developed for Year Eleven Food Technology (sixteen years of age) students. The module was developed using a framework (CLEO – Curriculum Learning and Education Online) that embeds learning technologies, utilises industry partnerships, has cross curriculum outcomes, scaffolds information literacy skills development and was the result of a working partnership between the Teacher Librarian and a teacher.

Introduction

Although the integration of technology in education has been patchy and had limited success in producing concrete evidence of improved student learning outcomes, the potential offered by emerging technologies is still recognised by educators (Apple Computer Inc, 2003, Blurton, 1999, Combes, 2005 & Oliver, 2002). Technology and the delivery of educational programs online provides alternative learning experiences; utilises a range of resources; caters for diverse student learning styles, multiple intelligences and individual differences; and can create a learning culture that integrates technology and information literacy outcomes across the school (Combes & Ring, 2004). Teachers can create holistic learning experiences. The power of the technology lies in the fact that the teacher can place all the resources in one place that can be accessed by the student anywhere and at anytime. The technology can provide detail and links to extra resources to extend students, while at the same time providing access to a range of templates and organisers to scaffold the learning for those students who require more direction and support.

Educators working in these “new” learning environments design programs that focus on learning as a process of constructing meaning and understandings, rather than a process of acquiring information or specific content, although acquiring quality information is also part of the process. Learning programs designed using these methodologies place the teacher as a facilitator and guide rather than a “sage-on-the-stage” and deliverer of content. The learning is student-centred and

embeds the development of information literacy skills to produce a graduate who is a lifelong learner. In other words, the students have the skills to be able to access quality information that meets their needs, deconstruct it and make meaning from it, reconstruct it and incorporate it into their knowledge base in order to learn new skills, content and applications in new learning environments.

This paper describes a module of online curriculum where the teacher librarian acted as the creative catalyst working in collaboration with a teacher. The program also developed a working partnership with a publishing company and a local business to provide access to extra resources and expertise, and a real world context for students. The program was the fifth in a series of seven such modules developed by the teacher librarian and is an example of a working model that was gradually extended and refined as part of an ongoing action research cycle. This model was eventually given the acronym CLEO (Curriculum, Learning and Education Online/Onsite) to emphasise the holistic nature of the learning embodied in the modules.

The CLEO model was developed by the author and further expanded in collaboration with Dr Jan Ring. CLEO uses an holistic and constructivist approach to the design of the online learning materials and has been successfully used in a variety of educational contexts (Combes & Ring, 2004). While the model utilises technology as a method of delivery it has also been trialled and found to be equally successful in a traditional, paper-based learning environment. While the

module discussed in this paper was developed for senior college students in Year Eleven, it has also been adapted and used successfully with students ranging in age from early childhood through to Year (typically seventeen/eighteen years old).

Online curriculum

The development of holistic online curriculum involves teachers working collaboratively to enhance learning programs across the school environment. It is the latest term to be used to describe the integration of technology into classroom practice. Another term that is often used in this context is, is used to describe a range of facilities that provide access to materials online. It has been used to describe courseware management systems such as WebCT and Blackboard, educational portals or more often, it is a term that is loosely applied to anything published on the Internet that concerns education. In this context includes teaching programs, specific lesson plans, training modules and print materials transferred 'en masse' to the Internet. These materials are often little more than books on screen. In most cases there has been no attempt to utilise the features of the technology to enhance the learning experience, to cater for different learning styles or to promote the development of student-centred learning and higher order thinking skills.

In the final report from the *Weatherstation Project* titled *Thwarted Innovation: What happened to eLearning and why*, the authors look closely at why the early promises of eLearning have failed to eventuate. The Weatherstation Project was designed by the National Centre for Postsecondary Improvement

(NCPI) to track the changing climate of across colleges and corporate America. In this report they found that as currently practised in the US is more about placing course materials online via courseware management systems, than innovative programs using technology to facilitate student learning outcomes (Zemksy & Massey, 2004). Since the dot.com collapse in 2001 a number of high profile ventures in the US have failed. These programs focused on a mass production based model for education rather than a mass customisation model (Werry, 2002) and indicate the need for a more holistic, 'grassroots approach that is easily adaptable at the classroom level. CLEO is one such model.

The Department of Education and Training Western Australia differentiates between the terms online curriculum, online learning and eLearning in its report *Online Curriculum: An Explanation and Exploration of Online Curriculum in K-12 Education*. In this analysis online curriculum is defined as:

... specifically curriculum materials available online that are structured, sequenced and specifically tailored to the learning outcomes desired by an education system.

Online curriculum may involve online learning, but may also involve learning in other environments and is not restricted to online learning (Burston et al, 2000).

Online curriculum as defined here includes a blend of teaching and learning approaches where online curriculum is part of a total resource-

based learning and teaching program. Online curriculum may include a virtual classroom where features of the technology are used to enhance and facilitate the learning experience (Burston et al, 2000 and Murray, 2000). This latest term describes the integration of technology in the classroom as a more holistic approach and encompasses the whole teaching-learning environment.

The CLEO model uses the above definition as a foundation for the design framework for each module of online curriculum. The model incorporates and exemplifies collaboration; resource based learning; student centred learning; effective and appropriate use of information communication technologies (ICTs); the development of higher order thinking; and information literacy skills necessary for lifelong learning. The framework is useful to:

- ensure a consistent approach;
- provide familiarity for staff and students working in an online environment;
- ensure all aspects are covered by the program;
- provide a structure that embeds good pedagogy and design principles;
- assist in the uptake of learning technologies by staff; and
- to create an online learning culture within the school

The CLEO model also provides sound pedagogical underpinnings for staff when designing online curriculum. CLEO utilises the 4MAT Constructivist Model of Learning (About Learning, 2005), which allows students to move through the learning experience at their own pace while recognising and incorporating

different learning styles. Educators have long recognised that people learn best when they internalise new information along a continuum of perceiving and processing. Successful learning occurs when students experience first and then conceptualise understandings from their experiences (About Learning, 2004). CLEO also uses features from the WebQuest model to engage students and encourage the development of higher order thinking skills (Dodge, 2001). WebQuests encourage role play in realistic contexts and allow students to work through a multi-layered learning experience with a specific goal in mind (Dodge, 2001). These modules of online curriculum include an open learning environment where students are expected to problem-solve and usually role play within a relevant scenario/context. The role play is set within a plausible location and students are faced with real life issues and problems.

A major design feature of the CLEO model is that it allows students to feel as if they are in control of their learning and working autonomously. This perception of autonomy allows students to take ownership of their learning and encourages independence even though they are working in a guided, structured and heavily scaffolded learning environment. It is the technology that allows teachers to create what appears to be a seamless learning environment that is both supportive for individual students, while also able to take students beyond the confines of the traditional classroom. The technology also allows teachers to create holistic learning experiences that ensure transference of skills between learning areas. Students use a range of

technologies to complete tasks, communicate with their peers and present their findings. A mix of learning activities including teams and group work, individual, absolute and optional tasks add variety to the learning environment.

The model also includes authentic assessment tasks where relevance to the workplace is transparent. A variety of assessment tools including reflection (metacognition), peer review, reports, documentation (ongoing), testing, processes and procedures, and forum presentations (oral) are used to measure student achievement. More importantly, the assessment tasks are designed during the planning stages of the module, so they are embedded into the learning process. Assessment tasks also reflect real-world problem-solving, students work as part of a team and produce ongoing evidence to document their learning. This particular module also included a competition. Fraser (1999, p. 16) describes authentic assessment as "... assessment tasks that resemble skills, activities and functions in the real world". The assessment tasks are designed to encourage cooperative learning and provide opportunities for students to develop skills that will make them adaptive and flexible learners in the workplace. Malan notes that through this approach "assessment then becomes a learning experience in which learners are prepared to apply their knowledge, skills and values in an integrated manner" (2000, p. 26). The competition also mimics the real world where only the best product is developed for the marketplace and the best company achieves market share. Authentic assessment tasks which have real world

applications are more relevant to students and provide a more comprehensive approach to assessment.

The technology adds another dimension to the learning experience. Students are provided with opportunities to practise their skills using technology in a relevant context. They have access to the learning materials and the problem to be solved anytime and anywhere. Placing the module online allows students to revisit the problem and work through it at their own pace, revise and review important information, contact peers and their teacher with issues in a non-threatening environment, link up with a range of resources via the Internet and the library, and use a variety of learning tools, for example multimedia simulations. In this learning environment the research is guided, the learning is thoroughly scaffolded and the technology allows the teacher to present the learning program as a seamless and holistic experience.

Product development

The school and the students

Students involved in this particular curriculum module were enrolled in Year 11 Food Technology (typically 15 – 17 years of age), a non-TEE subject (not for university entrance) offered in Western Australian secondary schools. The Senior College was newly built and in its second year of operation. While the college's technology infrastructure was exemplary (one computer per two students) and most of the courses were online by the end of the first year, other resources were limited. Students had access to the college resources from 8am – 5pm during the week and the college operated on a flexible timetable.

Students attended lessons on campus, but were free to move off campus during the school day or move around the campus to access resources as required. The library was not a 'bookable' space, but operated more like a university library. A student advocacy program operated where each teacher was responsible for up to fourteen students. Teacher advocates assisted students in setting goals, managing their time, dealing with personal issues and coping in the more flexible learning environment. College operations were designed to encourage students to be more independent, to take responsibility for their own learning and to prepare them for tertiary education or the workplace. The students at the college came from some of the lowest socioeconomic urban areas in Western Australia, most did not have academic backgrounds and were a culturally diverse group (over forty-two different ethnic groups). One third of the students in the college came from diverse locations in the Perth metropolitan area, one third from a middle school with a teacher librarian who was running a traditional library skills program and one third from a middle school that had replaced their teacher librarian two years earlier with an extra physical education teacher. Hence, students arrived at the college with a range of skill levels and differing attitudes to the library and the research process.

Collaborative partnerships

There were three major collaborative partnerships in the development of this module: a partnership with a local industry (Bakers Delight, a franchise bakery), a memo of understanding with a publishing company (John Wiley and Sons Australia) and the collaboration

between the teacher librarian and the Food Technology teacher at the college. The local bakery provided ingredients, expertise in the form of guest speakers and the judging panel at the marketing forum. The publishing company gave permission for the inclusion of copyright material to be used in the online environment. The collaboration between the Food Technology teacher included the glossary and content for the bread facts section. Minor collaborations occurred between the teacher librarian and the Mathematics department to refine the information on surveys and data collection, a topic the students were completing in Maths classes concurrently with the online module in Food Technology. The section and support documentation on report writing was developed by the English Department and had already been used in several earlier modules. Templates and organisers developed for each module were designed as generic documents and re-used to help students transfer essential literacy and numeracy skills across curriculum learning areas. The collaborations allowed for:

- opportunities for students to access professional expertise and resources;
- links between the college programs and the workplace to be transparent;
- online access to authoritative information from a reputable publisher;
- transparent links to be made between other learning areas;
- a high profile for the teacher librarian and the role of the library with both students and staff; and
- a consistent approach for all students.

Hot from the baker's oven! The product challenge

A real life scenario was presented to students as a product challenge at the beginning of the module. Each student was given the role of manager at the local Baker's Delight franchise store where the owner has set a challenge for the team working at the bakery. The challenge was to develop a new bread product with the following qualities:

- it is a snack food;
- it will have particular appeal to the teenage market;
- it will be cost effective; and
- it will be easy to make (a no-fail recipe).

As manager, each student had to showcase the new snack food and the process used to develop the product at the *Value Adding Quest*, so their documentation of the process used to develop the product had to be very thorough and include both written and photographic records.

Students conducted a total of six tasks during the challenge and worked in teams of three or two students. Their first task was to gather background information and complete an online quiz. This information included a series of case studies provided by John Wiley and Sons, information about the technology process and how to create a design brief. The second task involved market research and included the construction of two survey instruments and the collection, collation and analysis of survey data. Students surveyed other students at the college about their snack food preferences to determine appeal for the teenage market and market niche. They also conducted a survey of snack bread products sold at a large, shopping

complex located nearby. Students also investigated occupational safety and health laws in relation to food production as part of this task, as well as drawing up an estimate of costs.

Task three represents the first stage of their product development and involved research into bread making in Australia, a summary of the principles of bread making and nutritional information, research to determine proposed recipes, design sheets indicating the proposed presentation of the finished product, a list of any equipment required and a time estimation for production of the product. During these initial phases student research was guided, with a range of links and information about resources available on the curriculum web site. Where possible, students were directed to a range of resource formats that included print (books and magazines), charts, videos and web sites. Online resources from the Internet included simulations (a virtual bakery), recipes, historical information and occupational safety and health legislation and food preparation regulations. Students were also provided with information about surveys, how to analyse data and a range of templates to use to get them started and assist them with the documentation process.

The second development phase (fourth task) involved trialling and testing their chosen recipe, and evaluating the final product. This testing phase was repeated three times, with students documenting each trial and refining their product during the process. The fifth task required students to present their product to the prospective clientele. As part of this task they devised another survey, held taste testings with college

students and compiled a report detailing results of the survey. The report contained a final analysis, any recommendations for refinement of the product and some strategies for marketing the product to the target consumers. The second part of this task was to present their product to the judging panel from Baker's Delight. Students were reminded about the importance of presentation and encouraged to use the digital cameras to keep a digital record of their product development.

The final task involved the creation of a small web site using text editing software. Part of this assessment included an understanding of design and how to create a user-friendly, easily navigable web site that clearly documented the design process. These web sites were entered into the Value Adding Quest, an annual competition that determines the best product development by secondary students in Western Australia. This part of the module took students to small web site that was the result of a collaboration between the teacher librarian and the digital media teachers, to produce a generic introduction to web site design that would enable students to produce quality web sites using the Web Wizard software.

These tasks reflected real-world practice and included information literacy and literacy outcomes. At all times, students could access the glossary of terms, templates, instructions and procedures to assist them when documenting their product development. The power of the technology allows program designers to include information and resources where students can access them at the point of

need. This creates a seamless learning environment that allows learners to engage in cross discipline activities and where the transference of essential skills between learning areas is transparent. Modules using the CLEO framework ensure that the learners use information literacy skills and competencies from across the curriculum in an integrated and meaningful way. The tasks and skills being taught reflect real-world problem-solving and are relevant to a practical, real-life context thereby increasing the chances of turning these into lifelong learning skills.

Student voices

An important element in good curriculum design is the evaluation process following implementation to measure the level of student engagement and achievement of learning outcomes. As part of the action research model each module of online curriculum was evaluated by the teachers and students. Criteria for evaluation included:

- the level of student engagement;
- the achievement of learning outcomes;
- completion of the tasks;
- the attitudes displayed by the learners and their feedback; and
- overall satisfaction with the learning experience (both students and staff).

In this case the teacher reported a hundred percent engagement with the task. A similar level of engagement was also reported by teachers working with other groups using earlier modules. Students reporting on previous modules provided feedback to Dr Jill Aldridge, a Post Doctoral Fellow and Jean McNish, a Doctoral student from Curtin University of Technology, who were conducting a three-year action research project onsite

at the College. Their project examined the evolving learning environment and how online delivery could be used to best effect in educational settings. Results from student and teacher surveys at the end of the second year of operation reflected the feedback from teachers working with the Product Development module and indicated that student engagement and motivation were extremely high. Feedback to the researchers also suggested that students enrolled in wholly school-assessed subjects preferred a learning environment where there was a more investigative and active approach as provided in the modules of online curriculum (Aldridge et al, 2002b).

Interestingly, students didn't feel that working with the module necessarily translated into higher grades, but they did consistently express the view that the online modules created unforgettable learning experiences (Aldridge et al, 2002). A major concern for teachers working in these new learning environments is the difficulty inherent in assessing information literacy skills using traditional testing methods. Teacher who are trying to graduate students who have the skills to be lifelong learners face problems when using traditional testing methods which do not successfully measure higher order thinking, problem-solving or information literacy skills, just as they do not measure changing attitudes to learning, motivation and levels of engagement. Education has yet to devise effective ways to measure integrative performance as exemplified in these modules of online curriculum (Becker, 1998).

In this particular module all students completed the tasks with varying degrees of success, including the development of a small web site to showcase their work. Students who had difficulties with learning or lacked basic literacy skills found the ongoing documentation component particularly difficult and were initially more likely to 'jump in' without doing the necessary preparation. Teachers reported that students soon realised they needed the documentation, particularly during the second phase of the product development when they were refining and evaluating their product. Students were enthusiastic about the module and the learning experience, enjoyed the flexibility of the online environment, but still insisted that the teacher/facilitator was an essential component (Aldridge et al, 2002a). Students also reported overall satisfaction with the learning experience, although a small number remained resistant to using technology as a learning tool. This result remained constant across the college and may be a result of student attitudes to technology and their culture of use. Researchers for *The Weatherstation Project* reported that while students wanted to be connected to each other, they viewed technology as a means to communicate with peers and for entertainment rather than as a learning tool. Online initiatives were viewed by these students as an enhancement to traditional classroom teaching rather than a viable alternative (Zemksy & Massey, 2004).

The teachers felt that the online module had engaged the students, particularly those who had previously been difficult to handle in previous programs. The scaffolding and ongoing assessment

assisted all students to develop structure and to manage their learning, with varying degrees of competence. All students completed the Marketing Forum and produced a web site for the Value Adding Quest. The winning team, as judged by the Baker's Delight panel, had their recipe chosen to be trialled by the company and included in the current product range. Several teams received commendations for their web sites by the judging panel for the Value Adding Quest. Overall, students and staff reported enjoyment in the learning experience and teachers intended to repeat the module the following year with a different group, with slight modifications to the scaffolding documents to support student learning.

Conclusion

"The creation of collaborative, cross discipline learning environments requires a high level view of the entire curriculum as well as cooperation and understanding between discipline groups in order to maximise the learning potential for each activity" (Combes & Ring, 2004). A critical factor for success when developing holistic curriculum as exemplified in this module is the availability of a robust infrastructure and an information literacy leader who can provide relevant guidance and assistance to teachers as they begin to design online learning materials (Blurton, 2003). The teacher librarian is ideally placed to fulfil this role. The teacher librarian has an overarching knowledge of the entire curriculum and the resources required to support each learning area. They understand the importance of the transference of skills and are able to recognise and capitalise on potential synergies between disciplines. Teacher librarians have the

capacity by virtue of their role, to be able to provide curriculum support for teachers at the grassroots or classroom level where it is most needed. Curriculum teachers may be experienced in the design and delivery of content based instruction but they are less experienced in designing open-ended enquiry based approaches which require an overview and general understanding of the whole curriculum (Oliver, 2002). It is the teacher librarian in schools who has this overview of the curriculum and who has the skills to be a key player in the design of student-centred, resource-based teaching-learning programs.

In this case the teacher librarian acted as a catalyst in the creation of innovative and immersive online curriculum modules that utilised a range of resources, embedded the use of technology and set real-world assessment tasks that promoted the achievement of higher order thinking skills and problem-solving. The curriculum modules were designed using a design framework CLEO (Curriculum Learning and Education Online), that is based in sound pedagogical methodology. The framework allows teachers to create holistic learning programs that are resource based, develop information literacy and literacy skills, pose real-world problems and promote higher order thinking, and place learning into relevant contexts for the learner. Students participating in the Product Development module worked within a highly structured framework that was heavily scaffolded to support learning outcomes. From the students' perspective, however, it appeared to be an open learning environment where

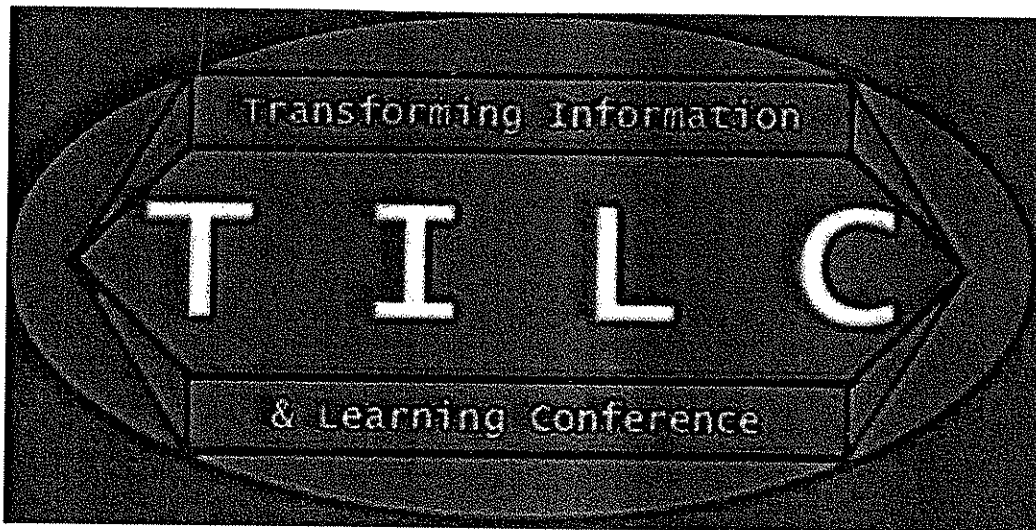
students were autonomous and in control of their own learning. Learning environments that utilise technology and the CLEO framework in this way, will help students manage their learning, develop information literacy skills and

turn what can often be a smorgasbord where a lack of guidance is a major stumbling block to learning, into a satisfying meal for both the teacher and the learners.

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