Wikis in Teaching and Assessment:
The *M/Cyclopedia* Project

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ABSTRACT
In a knowledge-based, networked economy, students leaving university need to have attained skills in collaborative and creative project-based work and to have developed critical, reflective practices. This paper outlines how a wiki can been used as part of social constructivist pedagogical practice which aims to develop advanced ICT literacies in university students. The paper describes the implementation of a wiki-based project as part of a subject in New Media Technologies at Queensland University of Technology. We discuss the strengths and challenges involved in using networked, collaborative learning strategies in institutional environments that still operate in traditional paradigms.

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1. INTRODUCTION
The advent of digital networks has signaled much more than the growth of technological networks. Digital networks have generated new work practices, new social connections, structures and communities. The rise of networks, both as material, technological and social artifacts, and as a way of understanding processes – as the dominant metaphor for our time – has brought with it some serious challenges to conventional structures that shape most areas of work and education.

This paper arises out of a project which uses blogs and wikis as part of a strategy to facilitate more advanced information and communication technology (ICT) literacies amongst a cohort of tertiary students and teachers in the Humanities and Creative Industries faculties at Queensland University of Technology. The project is a response to understanding that workplaces in a networked economy increasingly need people who are skilled in collaborative and creative practices and who possess an ability to think critically. Blogs and wikis were identified as useful vehicles for exploring and facilitating the kinds of literacies this project seeks to achieve.

There are interconnections and synergies between the broad context of the new economy and its network structures (and the concomitant shift away from linear, industrial-era models of production and communication), and the move toward social constructivist pedagogical models in education which employ social and collaborative project-based strategies for teaching and learning. New media tools such as blogs and wikis can help to implement networked, collaborative pedagogical strategies that help in teaching the literacies and skills students will need in a work environment in a knowledge based economy. We explore in this paper not only how the structural features of wikis can be employed to teach new media literacies, but also where the limitations lie, and how they might be addressed in the future.

2. BACKGROUND
> Knowledge sharing and creation is at the heart of innovation in all fields – science, art and business – and innovation is the driving force for wealth creation. … Information can be transferred in great torrents, without any understanding or knowledge being generated. Knowledge cannot be transferred; it can only be enacted, through a process of understanding, through which people interpret information and make judgements on the basis of it. … Great tides of information wash over us every day. We do not need more information, we need more understanding. (Leadbeater, 2000:12)

Leadbeater's observation alerts us both to the economic and strategic significance of knowledge creation in current

workplaces, and to the idea that the generation of knowledge and understanding is a more complex process than the simple transfer of information. The skills that students in tertiary education institutions need to acquire if they are to succeed in new economy workplaces are much more than basic literacies with ICTs. We need to build courses which develop their abilities to be creative and generate new knowledge within collaborative networked environments. In order to be successful in the highly informational, networked environment of the network society (cf. Castells, 2000), students must be able to critically assess the information they access, and to work creatively and collaboratively with others as they work with it and develop and distribute their work. (They must also be able to critically assess their own work, showing awareness especially of ethical and moral standards in building on the intellectual work of others.) This observation points to a new level of information and communication technology literacies which must be attained by students – a set of critical, collaborative and creative ICT literacies which we call the CCC literacies.

In terms of using ICTs this obviously requires much more of the university than implementing a basic content delivery system. E-learning systems that deliver content through modules and templates of pre-developed coursework may be effective in some learning contexts. But as Schneider *et al.* (2003) identify, alternative uses of ICTs in teaching and learning environments exist which are more project-based and more collaborative in nature. Wikis, MOOs, Web-fora and blogs are all applications that can facilitate more interactive and creative learning environments in which students are obliged to 'enact' their understandings, to create and communicate their knowledge.

Network structures present a number of challenges to the linear models that have shaped our practices in many areas in the past. The network economy discussed by, for instance, Castells (1996), Hardt and Negri (2000), and Leadbeater (2000) relies on different processes than those of industrial manufacturing economies. The linearity and unidirectional nature of the production line, the process of taking raw materials, subjecting them to various processes and manufacturing a particular product which is then distributed in the marketplace for consumption by 'end users' has been superseded by processes which are more flexible, multidirectional, reliant on knowledge and creativity, and collaborative in nature. In such processes, the figure of the (largely passive) consumer or end user is rapidly being replaced by a new form of user who acts, in collaboration with other peers, as an active producer of content in the very act of consumption. Far from the professional consumer alluded to by the term 'prosumer', this new producer-user is best described as a 'produser', an active and collaborative participant in the distributed production of new ideas and knowledge (see Bruns 2004, 2005).

This collaborative aspect to the creation of value presents serious challenges to some entrenched institutions – for instance the publishing industry and its linear model of publication. The traditional approach relies on an idealist conception of authorship (as singular and divinely inspired from a creative wellspring, rather than multiple and building on the work of others), the

creation of intellectual property in a finished text, and rights of distribution to a marketplace of non-productive consumers. However, the 'remix' culture (Lessig, 2004) of music downloading and remixing (as well as many other forms of cultural engagement that are based on similar principles of reappropriating, remixing, and redistributing) shows how inadequate this model is to deal with the culture of multidirectional, multi-authored environments, where texts are never really finished.

Networked production, on the other hand, from a media product such as an online computer game to developing a map of the human genome, implies multiple authors, recursive and non-linear production cycles and distributed authority (see Humphreys, 2005). Consumers have become producers (or produsers) in many areas. As an example, one of the most successful computer games of the past few years, *The Sims*, had 90% of its content created by the players (Herz, 2002). As a multi-million dollar success, such an application should not be ignored, even if one may find the content banal. The structure of the application – the fact that it placed the tools of creation into the hands of the users and allowed them to build their own content – is one that exemplifies certain aspects of the network economy that are crucial. The shape of this new economy is being created through changing patterns of consumption, where grassroots creativity and user-led innovation are key to the development of economic and social value. Hartley (2004) has termed this the 'drift of value' – where meaning and value have shifted over time from being attributed to the author, to the text and now the user. If students are the 'users' or the 'clients' in our educational institutions, then they need to be given the tools for authoring, at least to some extent, the process of their knowledge creation.

3. SOCIAL CONSTRUCTIVIST PEDAGOGY

However, much of our education system remains based on the idea that the teacher/lecturer will impart their knowledge to the student through a one-way communication system, such as lectures or text books. For reasons of convenience more than pedagogy, academic delivery is often structured in a linear fashion – papers present an argument which builds from introduction to conclusion; subjects offer a series of lectures which present content in weekly installments over the course of a semester. While some aspects of this linear structure are no doubt useful – such as beginning with an introduction – others may be counterproductive as they reduce the range of information and knowledge available in a given field to an overly simplified, historicised 'story' which privileges one form of explanation (for example understanding events by following the order in which they happened) over others and presents knowledge as fixed and objective.

A presentation of knowledge in this form encourages rote learning in students and is misleading in most complex fields of study. It supports the mistaken belief that most facts about the world are knowable and can ultimately be learnt with enough diligence, rather than helping students understand that there are any number of explanations for each apparent 'truth' and that it is important to

view each issue from a variety of perspectives. As Lankshear *et al.* (2002:24) note, "the new conditions require us to look again … at what counts as knowledge and truth" and that we "must help prepare learners for successful participation" in the new practices of creating knowledge. While the simplified approach may be useful in the early stages of study to avoid overwhelming learners with a barrage of differing possible explanations for the same phenomena, at more advanced stages it is just as important to acknowledge uncertainty and disagreement. This problem is hardly new – however, it is thrown into a sharp new focus by the significant increase in viewpoints on virtually any issue that have been made available to us through participatory information and communication technologies.

How are we to develop literacies and skills in our students that allow them to function effectively in these new environments? The network economy relies on knowledge workers who are characterised as flexible and willing to work in a short term, project-based contract system. They are comfortable with ambiguity, and are lifelong learners, highly mobile, entrepreneurial and creative (Thornburg, 2002:34). If knowledge work requires people to be actively creative, to collaborate, to understand the shape of project work, and to be willing to learn continuously, then educational institutions need to model environments for them to learn to do so.

Creating effective pedagogies often means we have to first overcome a number of challenges in the education environment. As indicated above, many education environments are modeled on a linear process of transmission of content. Online environments are regarded as spaces for the delivery of content created by the institution for the learner. The roles and power relations are well defined, and more importantly, institutionalised. Thus it requires an institutional will to change, to begin to effectively introduce alternative kinds of learning environments. Although there are currently a growing number of individuals implementing online learning environments that deploy a social constructivist mode of operation, and the use of blogs and wikis in particular (as will be discussed below), they are often stymied by institution-level requirements for particular assessment schemes or the measurement of particular kinds of 'learning outcomes'.

Social constructivist learning environments are not 'open slather' free-for-all environments with no constraints, where students decide everything about their directions and outcomes. The role of the teacher in these environments is still crucial and has been described by Schneider *et al.* (2003) as that of facilitator, manager and orchestrator. Introducing project-based, problem-based, enquiry-based or case-based learning scenarios, and then providing the tools and goals for students to engage in collaborative and individual knowledge building can be a much more demanding process for the teacher than traditional modes of delivery. This kind of pedagogical design is based on the idea that "in order to learn, students have to create" (Schneider *et al.*, 2003). The aim is to encourage problem solving, a depth in conceptual understanding and the acquisition of applicable knowledge. There are three main characteristics built into social constructivist scenarios: they use complex, realistic problems; they use group collaboration, interaction and cooperation; and

learners are responsible and set goals, while teachers provide guidance (from Merriënboer and Pass, 2003, quoted in Schneider *et al.*, 2003).

This kind of pedagogy is construction based, in that it builds on existing knowledge of the learner as well as interaction with the environment. It is also activity based. The interaction and collaborative aspects of the learning scenario trigger a variety of different types of learning processes, through explanation, disagreement, the development of mutual regulation strategies and so on. It is reasonably clear how this particular set of activities carries over into the project-based, collaborative work environments many students will find themselves in upon leaving university.

4. WIKIS

Wikis present themselves as an interesting tool for enhancing social constructivist learning environments. As non-linear, evolving, complex and networked texts with multiple authors, they can provide a great opportunity for student collaboration, co-production of texts, argument, and interaction. Most existing wiki systems are also flexible enough to support a variety of approaches for employing them in teaching, research, and academic administration and information settings (and even in all three at the same time); however, this flexibility and openness can also present significant problems and challenges to students and academics encountering the wiki environment. Some of these challenges will be detailed below, using the development of a wiki-based teaching and assessment environment in the New Media Technologies subject at Queensland University of Technology as a case study.

New Media Technologies forms part of a larger teaching and learning project involving wikis, blogs, and more basic online teaching tools at Queensland University of Technology. The purpose of this project is to use these online teaching environments to combine the development of the advanced 'CCC' ICT literacies with the promotion of the pedagogical goals discussed above; in other words, we have sought to avoid a separation of technical skills from pedagogical goals. Although in some senses a wiki is merely a technological tool, and students' familiarity with this technology does not constitute an end in itself, at the same time its form and functionality mirror the wider need for CCC literacies and enable a different, collaborative style of learning. Using a wiki develops particular skills in the students which are valuable well beyond this specific technological environment.

Learning in a wiki environment is learning technical literacy, content creation in a digital environment, the art of collaboration, consensus building, creating explicit knowledge from tacit understanding, and effectively communicating ideas to other people through networked knowledge environments. Therefore, while the wiki itself may well be only a tool for the exploration of a particular area of content that is largely unrelated to the specific technology used, the skills required to use the wiki effectively, which develop through the use of the wiki system, can be seen as equally important. Additionally, wikis also present some further challenges for educational settings – around ownership and

attribution of work, valuing and assessment of relational processes, and the need to redesign coursework to better accommodate and integrate the networked structures of learning.

As a highly flexible technology for the organisation and presentation of content which does not inherently prescribe specific informational structures, wikis can of course take many forms and be designed to fulfill a variety of functions. In educational settings universities are utilising them for very simple through to very complex tasks. At the University of British Columbia in Vancouver, for instance, IT staff identify five separate ways people have chosen to use the available university-wide wiki facility. It has been used by staff inside a WebCT environment as a planning tool for courses (establishing reference lists, repositories of course outlines, brainstorming strategies for teaching and so on). It has been used as an in-class communications tool – fulfilling a kind of bulletin-board function enabling staff-to-student and student-to-student interactions. It has been used for collaborative content management and project development, for think-tank planning, and finally as a site for collaborative writing in a composition class. Other universities are also creating and using wikis for a variety of purposes; the University of Calgary, for example, appears to be in the process of switching its entire internal information system for staff and students to a wiki basis (see http://weblogs.ucalgary.ca/wiki/). At Georgia Institute of Technology wikis have been deployed across a number of disciplines with learning outcomes shown to be significantly better for students using the wiki environment to collaborate and comment on each others work (Rick *et al* 2002).

In this context it is important to stress that a wiki is not inherently only an open and collaborative tool. Access (both to content in general, and to content editing functions) can be limited only to a select group of users, and developers can add features which further police or close down the opportunities for viewing and participating in the wiki. Elrufaie and Turner (2005) have discussed how they built a system of permissions and access protocols that limited access by area or by user for courses at California State University, San Bernardino. These permissions and access limits were built into their system to address some of the concerns derived from the conventional education system – that students needed to produce individual projects, that assessment needed to be of individual work, that other, non-enrolled people should be kept out, that public access to look at the work (by other class members) should be limited to when the student has finished the project and so on. In addressing these concerns they have effectively stripped many of the collaborative group learning possibilities out of the system. While such concerns about work-in-progress or the attribution of student contributions to the right students are of course legitimate, and while even such modified wikis remain useful teaching technologies, at the same time the possibilities of wikis as open and collaborative learning environments can be missed or undermined in the push to make them conform to more conventional learning paradigms.

5. WIKI WORK

For many students, the writing of wiki entries presents a significant challenge. Encyclopedic topic entries require a different compositional style from the linear argumentative essays which students are usually asked to submit for assessment. If a student-produced wiki adheres to the *Wikipedia*'s Neutral Point of View (NPOV) policy, with its requirement to present both (or the many) sides of an argument, this promotes a different style of communication, and the value of the process of negotiating over the content of the entry cannot be underestimated.

> Wikis encourage and support dialogical, collaborative, essayistic or associative rhetoric over a monological, thesis/support rhetoric. The openness of the wiki makes it difficult to lock it down to a final authoritative, complete, single-voiced version. (Morgan, 2004)

Morgan observes that the processes involved in moving from threaded mode to document mode – or from the more informal mode of argument carried out in the dialogue between authors to the formal NPOV document mode – serve to implement a kind of ongoing meta-analysis on the part of the authors; this constant meta-analysis is a way of developing critical thinking skills in students. Viégas *et al.* (2004) make the point that wikis are a space that, with the production of the document or topic as a goal, encourages people to do more than argue back and forth. The goal of producing the topic/document entry encourages people to reach consensus, to resolve their arguments. This constitutes a significant difference from threaded community Web fora where there is no such imperative and discussion may continue interminably. It reflects more authentically the conditions of workplaces, where conflict resolution, compromise and consensus building are often required in order to carry out the work.

Of course another aspect of the wiki process described here is that topic entries are always available for further discussion, refinement, or alteration. The state of knowledge on a wiki is always dynamic, with the threaded mode of the discussion forum representing a more unstable form, and the document mode of the wiki a somewhat more stable, but still not completely fixed mode. Or as Morgan puts it: "when a thread becomes a document it is but a moment's rest." (Morgan 2004)

Some of the benefits that accrue to students engaging in the collaboration and the interactions involved in creating wiki topics derive from encountering other students' viewpoints. "Students need these interactions to provide experiences, viewpoints and stories alternative to their own, which will enable them to alter their individual stories in new ways" (Blank *et al.* 2004). Social interaction can be a rich source of learning, and as social constructivists point out, scenarios or environments that enable or value student-to-student as well as student-to-teacher interactions are important. "The most powerful experiences are those in which the interaction occurs throughout the group instead of between one participant and the facilitator" (Palloff and Pratt, 1999:19). If we learn through 'enactment' as Leadbeater suggests above, or through 'creating' as Schneider *et al.* suggest above, or, as Blank *et al.* (2004) suggest, through "an essential interplay between experience and reflection", then the rhetoric of the wiki in *Wikipedia* style can be seen to engage all these processes. In

considering the role of the social in learning, Blank *et al.* (2004:8) point out that it "invites us to attend to the role of the group in individual performance, as well as to the contributions individuals can and should make to the learning of other participants". The wiki form is one that encourages and enables learning in ways that many other Web-based tools fail to do. Its social, interactive, collaborative and dynamic features encourage learning in more complex ways than an 'e-learning content delivery'-style application can. The benefits of working with this kind of tool include also understanding the inherent instability of knowledge as is demonstrated in the constantly revisioned, unfinished format of the *Wikipedia*. Lifelong learning can become a reflexive and 'naturalised' approach if a student understands the dynamic, always-changing nature of knowledge.

Blank *et al.* (2004) used a wiki as part of a course on emergent pedagogy delivered to a cohort of high school teachers. They identified a number of problems around the collaborative processes in their wiki. First, students in the class were too polite to want to interfere with other students' work. This meant that at least to begin with, very few edits were made on other people's work. Second, students did not want their own work to be interfered with by others. This conceivably pertains to the design of the exercise in this particular wiki, where students 'owned' particular pages individually. As the entries on the page were attributable to them and public, they did not want other people to add to or change their work. Third, students were reluctant to release their work into the public domain in a less than perfect state – they did not want their work in progress to be subject to scrutiny and judgement.

These are interesting issues in that they represent to some extent the uneasiness with which people encounter collaborative and networked environments and multiple authorship. It is possible that only if we make explicit the differentiation between zones of individual and collaborative activity will students begin to benefit from the different kinds of learning available to them in collaborative environments. The issues raised above also represent issues of a conventional education system based on linear production (of delivery, of work, of authorship) meeting a networked production system.

6. CASE STUDY: DEVELOPING THE *M/CYCLOPEDIA* OF NEW MEDIA

Our experiences in the introduction of a wiki-based teaching and assessment environment to the New Media Technologies subject in the Creative Industries Faculty at Queensland University of Technology underline many of these observations. NMT is a keystone subject for students majoring in media and communication, digital media, or communication design fields, and presents new media technologies and related issues in a social rather than a purely technological context; it is taken usually during the second or third year of students' Bachelor of Creative Industries degrees.

Predominantly linear approaches are unsuitable here for a number of reasons: for one, the relatively brief history and continuing rapid development of new media technologies does not allow for a historicised presentation of content at this point. Also, and more importantly, the aim of this subject cannot be to present simply the story of these technologies' development over time, from punchcards to wireless; rather, it must focus on social, political and economic contexts which are often far more complex and multifaceted (and therefore ill-suited for linear exploration). Additionally, assessment in the subject is expected to enable students to experience advanced new media technologies in authentic exercises (developing their critical, collaborative, and creative ICT literacies), and must therefore also take on a networked rather than linear structure; this has impacts on content delivery once again.

Wikis were identified as a useful technology for achieving these aims. A wiki environment is being introduced into the subject in a number of stages, over the course of several years; subject redevelopment in NMT began (in the second half of 2004) by revising the subject's assessment structures. All assessment now takes place in an internal wiki specifically set up for the subject, which uses the *Wikipedia*'s MediaWiki system. In this environment students work individually and in groups on their various assignments, in a series of steps. In the first iteration of the subject in 2004,

1. students began by developing a brief annotated bibliography on a new media-related topic of their choice, and on the basis of this work then formed groups in which they tackled their major assignments.
2. These groups collaborated first on a major wiki entry on a major, communally chosen topic, and
3. later individual students added further sub-topical entries which are interconnected amongst themselves as well as to the major topic entries.

In the process they developed an encyclopedic collection of information on new media concepts and topics, which at the end of semester was edited by teaching staff and published to the wider Web on a separate site as the *M/Cyclopedia of New Media* (wiki.media-culture.org.au), under the imprint of academic online publisher M/C – Media and Culture (www.media-culture.org.au).

The wiki system was also used to significant extent in the facilitation of tutorial work and for student interaction outside of classes. Tutors were able to set up discussion groups in the wiki for each of their classes, and used these groups to coordinate their students' emerging group projects – through these discussion groups students were able to nominate topics of interest to them and thus find like-minded collaborators, and student teams could begin to flesh out their project ideas (while at the same time providing the tutor with a permanent record of their project ideas and overall participation in class). By creating new, blank topic entries on the spot for their proposed topics, and signing these with their user names, they could in effect stake out their territory to avoid conflict or overlap with other student teams in their own or other tutorial classes.

At later stages of the semester, as student teams began work on their collaborative wiki entries, they were also able to use the discussion fora attached to each topic entry in the wiki as a way of facilitating their group work. Further, the revision history functions in the wiki system enabled them to track the changes made by each group member (as well as helping tutors make sure that students were doing their work in time). At this collaborative stage of their work, individual students were also asked to begin mapping out the sub-topics which they would cover on their own in their final assignment. Once again they could already create pages for these sub-topics and thereby mark their online territory to avoid overlap or conflict with other students working in related fields.

This first stage of development in New Media Technologies uncovered several challenges for students and teaching staff. Most importantly, perhaps, it highlighted the fact that while students relatively quickly began to feel familiar with the technological environment of the wiki itself (the ability to add and edit pages, and the formatting codes used by the MediaWiki system), they continued to struggle with the content format required for encyclopedia entries. Some of their work (especially at early stages) continued to resemble academic essays rather than encyclopedia entries, attempting to argue a point and to arrive at a single conclusion rather than to present multiple points of view from a neutral perspective (as postulated by the *Wikipedia*'s NPOV doctrine). For future iterations of the subject this means that early tutorial work will need to increase students' familiarity with the required content style and authorial stance – especially perhaps through virtual 'field trips' to the *Wikipedia* itself.

As students began to identify their intended topics, the problem of coordinating some 150 students across six tutorial classes offered another key challenge. While within individual classes overlap between student topics could largely be avoided, coordination amongst classes was more complicated. The problem was further compounded by some of the inherent limitations of the MediaWiki system: for example, it is case-sensitive, so that two different student groups could stake out 'Bluetooth security' and 'Bluetooth Security' as their topics without becoming aware of any clash in their topics. Additionally, there was no immediately obvious method for disambiguating proposed student group topics: 'Security – Bluetooth' and 'Security (Bluetooth)' could be further valid topics proposed by student groups. In future, therefore, it will be necessary to prescribe much stricter rules for the naming and formatting of topic titles, and further measures to coordinate across tutorial groups are required. Much can be learnt from the *Wikipedia* in this respect.

7. FROM WIKIPEDIA TO *M/CYCLOPEDIA*

There are limits to the extent of experience which can be transferred directly from the *Wikipedia*, however: much of its success crucially depends on the 'multitude of eyeballs' principle which is common to many open and collaborative content development projects (also including open source software

development, of course). The number of participants in the New Media Technologies wiki is far more limited (some 150 students plus teaching staff), as is their knowledge of the field, which means that factual or stylistic errors may go uncorrected for a longer period of time.

Further, the *Wikipedia* (and other collaborative sites, such as the photo sharing site *Flickr*) can rely on the collaborative development of shared grassroots taxonomies – or 'folksonomies' – for its content. This taxonomy comes from within the user community, and can then be used to organise and categorise its content; this is unlikely to occur within the much smaller community of New Media Technologies wiki contributors. In preparing the wiki for publication as the *M/Cyclopedia of New Media*, therefore, it has remained necessary to fall back on staff expertise for the organisation and presentation of content. This introduces particular biases, however.

Finally, the comparatively small number and relatively uniform nature of wiki contributors in this project (tertiary students in the Creative Industries degree, and teaching staff) also undermines the Neutral Point of View principle to some extent. Attitudes towards new media issues within this group may remain relatively homogenous, resulting in a situation where even with the best of intentions to produce NPOV-style articles some legitimate alternative viewpoints may be ignored simply because contributors are wholly unaware of them. Other than to stress the importance of wide and thorough research in the preparation of wiki entries, it appears that little can be done to alleviate this potential problem. However, the *M/Cyclopedia of New Media* has been well received upon the publication of its inaugural version, and some international new media academics have expressed an interest in having their classes collaborate on the wiki; such a broadening of the contributor base could conceivably help to increase the range of viewpoints covered by *M/Cyclopedia* content.

Clearly, the New Media Technologies wiki as it has been utilised so far does not constitute a wiki system in the fullest sense of the term, providing a collaborative content development space which is open to *all* contributors; for educational purposes at least in the context of this subject such a space would be counterproductive. Direct student collaboration remains limited to their immediate teams, since a wider collaborative approach where each student was encouraged to edit any of their peers' encyclopedia entries would seem to make effective assessment virtually impossible. Access to the New Media Technologies wiki also remains limited only to students in the subject, as editorial invention from outsiders would similarly complicate equitable assessment of all students' work. Additionally, for reasons of quality control and institutional policy it is necessary to retain a further editing step which removes any sub-standard material from the eventual body of information before the *M/Cyclopedia of New Media* is finally published as a read-only encyclopedic Website.

It must also be stressed that the wiki-based teaching and learning approaches in New Media Technologies have undergone only one iteration so far. The second stage of redevelopment, for semester

2/2005, will require some further work. Rather than developing a new resource, the incoming student cohort can now work on the already existing encyclopedia, adding and updating entries. In addition, the encyclopedia itself also constitutes a formidable resource for teaching and research, of course, so that future learners in the subject will increasingly access networked information resources rather than the traditional linear textbooks and other readings used in the subject.

However, the increasing availability and quality of this networked resource also further complicates the delivery of content in this subject: a traditional lecture series would be seen as more and more out of step with the innovative resources and forms of assessment available to students. 'Lectures', then, must be reconceptualised for 2/2005: at present, it is likely that they will be concentrated at the start of semester, and may take on a more flexible structure which includes multiple presenters and involves interaction with learners as much as is possible in a class of between 100 and 200 students. It may also be possible to explore use of the encyclopedia itself in a 'lecture' context: so, instead of traditional Powerpoint slides entries from the encyclopedia could be displayed and discussed at times. This would help to show the multiple connections between each topic and concept included in this resource (and point students to gaps in its coverage which they could address through their assessment work).

Such redevelopment efforts clearly form only part of an ongoing project to explore new teaching approaches for large classes, away from traditional linear lecture-style delivery while retaining face-to-face elements. Without overly privileging technology, lessons can be learnt from the information and knowledge structures made possible and popular by current new media, information and communication technologies; they must be learnt because of that popularity in society as well as because they now form a crucial basis for knowledge economies. In order to become active, effective, confident and creative produsers of quality content, students must be presented with learning environments which foster the critical, collaborative, and creative ICT literacies which are required in this environment – but the problem of overcoming traditional teaching styles is far from trivial.

Advanced, 'CCC' ICT literacies, such as QUT is seeking to develop in its students, incorporate these ideas and skills in their understanding of what literacy means. Developing an understanding of how to function in, benefit from, and contribute to collaborative group projects and learning environments is part of what well-developed ICT literacy projects can encompass. Wikis (as well as some other collaborative Web-based content development, distribution, and discussion technologies) provide a very useful tool for such projects.

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