ISSUES INVOLVED WITH IMPLEMENTING A STUDENT-CENTRED TECHNOLOGY-BASED TOOL

The Case of a Multimedia Glossary

David M. Kennedy
Hong Kong Institute of Education, Tai Po, Hong Kong

Keywords: Learning tool, Glossary, Adoption.

Abstract: There is evidence that glossaries are perceived by students as highly desirable assets to improve learning. This paper describes the development of a glossary tool, the Multimedia Enhanced Glossary to Assist Understanding (MEGA-U), which can leverage the resources available on the internet, support communities of practice and support student-annotation of glossary terms. Customized glossaries should enhance student-centred online learning environments. However, there are significant barriers to successful deployment of the glossary system in pre-service teacher education Hong Kong. The paper describes the tool, and then examines the reasons why the tool is not being used as expected, highlighting some of the pedagogical, logistical and cultural factors that inhibit the use of the software.

1 INTRODUCTION

There is strong evidence that online glossaries are perceived by Hong Kong students as highly desirable assets to improve learning. McNaught and Lam (2005) conducted a meta-analysis of evaluation findings for 58 courses in Hong Kong. The highest ranked function was the provision of learning tools such as glossaries. One explanation for this is that, in Hong Kong, English is classified as a foreign language, and the standard of English is a matter of concern. It is not surprising that online dictionaries (Chinese and English); and glossaries of technical terms, especially with audio pronunciations or visual material, are highly valued.

Hong Kong students' desire to have access to good glossaries was a key feature in the decision to develop the glossary tool that will be described in this paper. The first section of the paper describes the development and functionality of the glossary tool. The second section reflects on the, as yet, unsuccessful attempts to have colleagues use this tool in their own courses.

2 DEVELOPMENT AND FUNCTIONALITY OF MEGA-U

The Multimedia Enhanced Glossary to Assist Understanding (MEGA-U) is a computer-based courseware tool designed to support the development of an online glossary for teachers/ lecturers and students engaged in developing courses with a web component. MEGA-U is designed to be more than a text-based glossary, as in a traditional book-based version and, indeed, in what is generally found on the internet. The functional aspects of MEGA-U include:

- a search engine capable of partial matching of words;
- display of a wide range of media resources;
- an easy to use authoring environment requiring no knowledge of html;
- the ability to create customized glossaries for a range of courses;
- the ability to involve students in the development of the glossary;
- facility for double byte character sets (multilingual support); and
- security protection for editing and usage of the glossary (or glossaries) by multiple users.

M. Kennedy D. (2006).
ISSUES INVOLVED WITH IMPLEMENTING A STUDENT-CENTRED TECHNOLOGY-BASED TOOL - The Case of a Multimedia Glossary.
In *Proceedings of WEBIST 2006 - Second International Conference on Web Information Systems and Technologies - Society, e-Business and e-Government / e-Learning*, pages 255-260
DOI: 10.5220/0001242602550260

The MEGA-U has been developed using the standards for reusable content articulated in the Sharable Content Object Reference Model (SCORM) of the Advanced Distributed Learning Network (Brown, 2002). The database has been developed using open-source software, MySQL and an Apache webserver.

Figure 1 provides a map of the workflow involved in developing a glossary. The hierarchy is:

- The Administrator creates a new named glossary entity into which content can be placed for the Glossary Owner, who may be the course coordinator.
- The Glossary Owner creates accounts for other teachers.
- Teachers create accounts for students.
- All members of the glossary team can annotate/ add links and resources to the glossary.

The glossary can be searched without a need for a password and/or username. In this way, students may be provided with access to a multimedia glossary without a need to add usernames or passwords in the first instance. The facility to annotate and add additional resources to a glossary term is considered a key component/ functionality of the MEGA-U. Therefore, a simple procedure has been incorporated in order to facilitate the uploading of student names, passwords and numbers via a comma-delimited file, should a teacher wish to provide all students with the facility to add to glossary terms. The MEGA-U is intended to improve the information literacy of students, by providing opportunity for students to annotate the definitions, add custom resources or links to suitable multimedia content thereby providing a student-eye view of the concept or term in the glossary. The glossary is also designed to support the development of communities of practice (C of P).

The design of the MEGA-U enables groups of teachers to work together to develop more complete, more media-rich sets of glossary terms. Moreover, the MEGA-U software enables resources to be linked across multiple servers anywhere in the world by the use of a Uniform Resource Locator (URL) and simple-to-use templates to map the size of multimedia resources for inclusion into the glossary. The MEGA-U has been successfully developed and tested. It is deployed in a number of pre-service teacher education modules taught by the author.

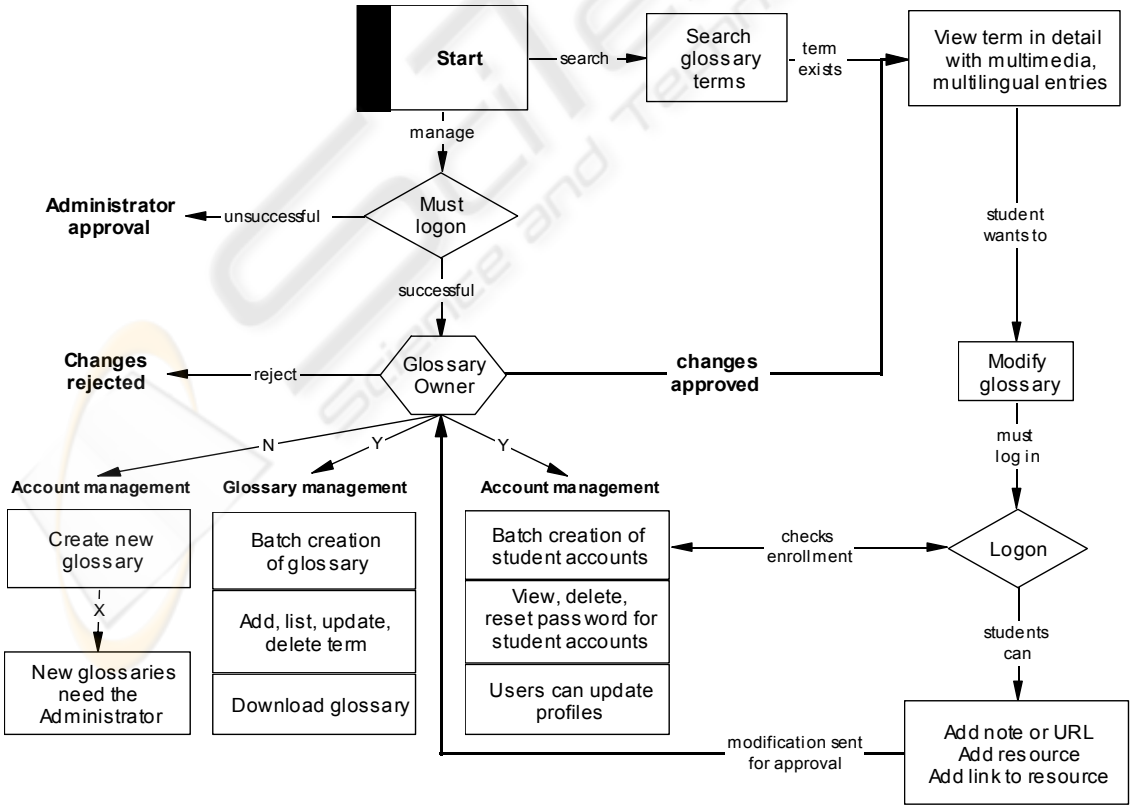

Figure 1: Workflow in the MEGA-U.

Table 1: Main features and examples of the MEGA-U in use.

Partial word matches in searching.	It is possible to enter one letter or a partial spelling and have the glossary engine return a list of possible term (Figure 2). This has advantages for many students who may not know the exact spelling of the word. The search engine is only in English. This is not perceived as a problem in Hong Kong since all students in schools study English from an early age.
Display of a wide range of media resources	Video, animation, graphics and/or sound can provide multiple perspectives of the definition or description of a term. In Figure 3, the term shown is 'photosynthesis' and it includes a graphic that is accessed from a remote server.
Simple to deploy	A single glossary entry, composed of multiple media resources from a variety of sources (URLs), can be assembled into a single coherent form for display (and interaction) to a student when required. The clickable MEGA-U icon can be placed in any webpage or as a replacement for a glossary in a learning management system, and is therefore available to students at any time.
Display information about any number of content domains	The database behind the MEGA-U is intended to simply store content or URL links and collate each of the elements of a glossary term on demand. In this way, the content can be updated easily.
Multilingual	The database supports double-byte characters.
Simple glossary creation	A basic glossary can be uploaded via a comma-delimited Excel file which includes the glossary term, definition, links to resources and related terms.
Web-based management	Glossaries can be managed from a standard web browser. The software engine has been tested with Internet Explorer (6.xx) and Firefox (1.0x).
Multiple levels of security	The levels are: administrator (creates glossaries), Glossary Owner and associates (editing, uploading terms, student accounts, adding resources, quality control), and student rights to annotate or add resources (URLs, multimedia).

Once a student annotates an existing entry, the Glossary Owner (key teacher) receives an email that links the teacher (via a web browser) to the changed term which now has 'Accept' or 'Reject' on screen in order for permission to be given for changes to the database. This is a key design feature of the MEGA-U, which is intended to maintain the accuracy and appropriateness of the content of any glossary, and protect against malicious or inappropriate annotations or links.

In Table 1, the main features of the MEGA-U software are summarized. Key aspects include the ease of authoring (students and teachers), partial word searches in English (very important in a multilingual environment such as Hong Kong), and managing access to the authoring components of the MEGA-U for students and teachers.

3 THEORETICAL FRAMEWORK FOR THE DESIGN OF THE MEGA-U

The theoretical framework of the project is based upon the work of Kennedy & McNaught (1997) which described the manner in which computer-facilitated learning (now more commonly called eLearning) may be considered from the perspective of either didactic, pre-emptive or transformative approaches to teaching (Bain & McNaught, 2006; Laurillard, 2002). These three conceptions of teaching can be briefly described as follows.

The didactic teacher believes in a transmissive view of learning in that knowledge can be directly transferred from teacher to student. This viewpoint tends to encourage surface or reproductive learning in students.

A pre-emptive orientation to student learning which, while sensitive to past students' prior learning and misconceptions, is teacher-centred and focuses on the teacher's explanations, rather than student activity.

A conversational or transformative conception is based on viewing learning as a process in which understanding is constructed by the student with the assistance of the teacher.

In Table 2, the three views of a glossary viewed from the perspectives above are shown.

The design of the MEGA-U extends the traditional text-based glossary to one that encompasses the affordances offered by the internet, with the additional potential to incorporate a more transformative approach to the material incorporated in the glossary. Including student-derived definitions and links has the potential to develop a multi-modal glossary better suited to the specific needs of students.

Table 2: Design elements of a glossary from a didactic, pre-emptive, or transformative perspective.

Didactic	Pre-emptive	Transformative
A list of text-based definitions and formulae.	The terms may be represented as text, graphics, video, sound, or simulations (multiple representations of concepts).	As for pre-emptive, with the additional facility for students to contribute multiple definitions to the glossary, and/or construct their own glossary.

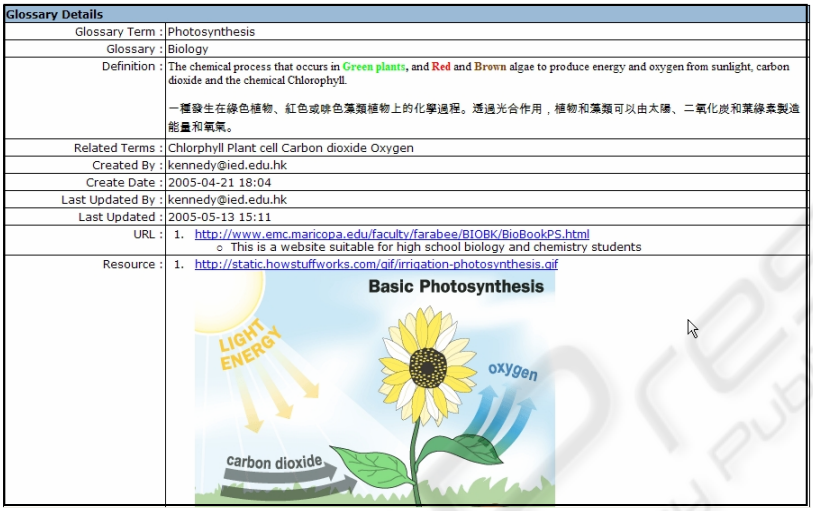

Figure 2: Graphics in a glossary entry.

When a student searches for a term, partial matches are shown (e.g., ph would produce pH and photosynthesis). When a student rolls their mouse over the row automatically expands to show all of the text (bilingual) for that term. In Figure 2, the student has clicked on the term 'photosynthesis' to show embedded multimedia resources.

The MEGA-U can either upload or link to any internet resource with a URL. A transformative approach to learning is supported by the ability of students to add to existing glossary terms. Additional text, links, descriptions and resources may be added to the glossary as required via a forms-based editing environment. In an existing term, the glossary term, definition and initial links, and resources remain unchangeable by the student. The student can add a resource description and link, a description, multimedia or a link to multimedia (the size of the object must be stated in pixels in order to provide the size of area for the object to display correctly).

4 EVALUATION

Initial evaluations have been undertaken with a small focus group (four students) from a multimedia class. The students had a link to the MEGA-U available as part of the online module resources. The comments by the students are summarised into the paragraphs below (this is a summary developed by one student for the group). More complete evaluations are ongoing, as the MEGA-U becomes a part of the teaching and learning environment of more modules.

The system is quite user friendly. Once you've input the keywords, for example, you input a word 'cancer', then the cancer's glossary will appear and then you can see the definition of cancer. Then you can click on the word cancer and you go to another page. After opening the webpage, you can see more details about this glossary item. You can see the pictures and also some URL links which provide more information to the item. The user can certainly click the URL links and find more useful information on the webpage created by the other people all over the world.

Moreover, you need not input the whole word and then you can start your search. For example, you need to find what photosynthesis is, but you forget the spelling of the part 'synthesis' or maybe you've already mixed up with other words, you can simply type the word 'photo', and it will start the smart search, giving you all the words with the spelling started by 'photo'. Thus, if you only type a letter 'a' and start the search, the system will give you all the words started with 'a' in the glossary. Additionally, no matter you input a capital letter 'a' or not, it will display both the capital ones and the non-capital ones. If you do not input anything and press the search button then all the items in the glossary will be displayed.

Responses from experienced educational designers in Hong Kong, Australia and the UK have also been positive. However, in order to be more fully evaluated, the MEGA-U needs to be used in a number of normal classes with a range of students and teachers. Therein lies the problem. A number of colleagues in a number of discipline areas at the Hong Kong Institute of Education have looked at MEGA-U and stated that it would be of real value in their classes. However, all have deferred actual implementation plans, claiming that students (who are pre-service teachers) would find this way of working too challenging, and that students would not 'trust' entries from other students. In the second section of the paper I will look at reasons for this viewpoint.

5 IMPLEMENTATION IN THE HONG KONG CONTEXT: THE KEY PROBLEM

In 1998 the Hong Kong Special Administrative Region government began a program of modernization as part of a five-year strategy to provide hardware and software, connect schools to the internet, begin professional development of existing teachers, and require teacher education institutions to mandate a level of information technology competency in education (ITCE) targets amongst new graduates. The original five-year plan achieved a number of milestones, primarily in technical, training and infrastructure developments (Kennedy, Fitzgerald & Lee, 2004). However, the hoped-for change in pedagogy did not occur in conjunction with the hardware and software roll-out. In 2004 progress was reviewed and the focus was shifted from equipment and infrastructure to pedagogical change, which articulated a more constructivist view of using ICTs to enhance and support teaching and learning in Hong Kong (Education and Manpower Bureau, 2004), arguing for a move from a teacher-centred to a more student-centred approach. This is a challenging shift as, in Hong Kong, a student-centred, collaborative approach to teaching and learning is not the norm in the classroom (Pearson, 2001).

It is claimed by the University Grants Committee that Hong Kong has enthusiastically adopted web-based technologies for teaching and learning in universities (Leung *et al.*, 2005). One reason is that the web is viewed as offering significant cost savings. However, the situation in schools is seem to be different with tightly prescribed curricula and more traditional approaches to teaching and learning still being the major form of student experience (Kennedy, Fitzgerald & Lee, 2004). In such environments changes in teaching practice are incremental and slow. There are some good exemplars of effective use of ICTs in Hong Kong, but these isolated examples have required substantive changes in the manner in which students are taught, a clearly articulated collective vision and strong school leadership over a number of years (Harrington, 2005).

6 CHANGING THE EDUCATIONAL LANDSCAPE

Ten years ago Hooper and Rieber espoused a belief that embedding technology in teaching and learning in schools would reinvigorate the role of the classroom teacher: "We envision technology as a teacher's liberator to help reestablish the role and value of the individual classroom teacher." (Hooper & Rieber, 1995, p. 154). They identified two things that were required in order to realize this belief. The first was a move to more student-centred teaching and learning. The second was the need to develop a community of teachers, students and parents that nurtured and supported the learning process (Cognition and Technology Group at Vanderbilt, 1992). Rogers (2003) went further and identified five key stages: knowledge, persuasion, decision, implementation and confirmation that are required before actual practices are likely to change.

Sherry, Billig, Tavalin & Gibson (2000) proposed a five-stage model congruent with Rogers' key stages that has been validated (in a three-year research project) for technology adoption and diffusion in US schools. The five stages are characterised by: teacher as: learner, adopter, co-learner, reaffirmer or rejecter, and leader. Each stage in turn is characterized by a series of strategies. For example in Stage 1, teachers are learning about the technology while in stage two they are beginning to adopt the technology. It would be fair to say that the majority of teachers in Hong Kong are currently between 'persuasion' and 'implementation' stages in the Rogers' (2003) model, but it is less clear with regard to the Sherry et al. (2000) model since there is evidence to suggest that the availability and access to computers in Hong Kong schools outside formal IT/ computer literacy classes is limited. While teachers are often interested in engaging with ICTs

to improve student learning, they are constrained by circumstances out of their direct control. Over 77% of teachers have achieved Intermediate ITCE competencies, but the implications of a survey of teachers in 684 primary and secondary Hong Kong schools were that only 6% of teachers show any evidence of innovative pedagogies and practice (Kennedy, Fitzgerald & Lee, 2004).

The design of the MEGA-U has been undertaken with constructivist principles in mind and a teaching and learning framework that is based upon a conversational framework in which students communicate with each other (Laurillard, 2002). However, not withstanding the design, the positive responses from the student focus group and experienced educational designers, there remain significant barriers to more widespread use. Establishing Communities of Practice (C of P) using ICTs in Hong Kong schools can be achieved but it is often limited to direct intervention (Yuen, 2003). The MEGA-U is being trialled in a number of courses involving pre-service teachers but only those taught by the author. Its use is still limited by current policies and practice.

REFERENCES

Bain, J., & McNaught, C. (2006). How academics use technology in teaching and learning: Understanding the relationship between beliefs and practice. *Journal of Computer Assisted Learning, 22,* 99–113.

Brown, J. (2002). *Making a Macromedia Flash MX learning object SCORM-conformant* (White paper). Alexandria, Virginia, USA: Advanced Distributed Learning Co-Laboratory. Retrieved November 28, 2005, from http://www.macromedia.com/resources/elearning/objects/

Cognition and Technology Group at Vanderbilt. (1992). The Jasper Experiment: An exploration of issues in learning and instructional design. *Educational Technology Research and Development, 40*(1), 65-80.

Education and Manpower Bureau. (2004). Empowering learning and teaching with information technology. Hong Kong: Education and Manpower Bureau. Retrieved November 28, 2005, from http://www.emb.gov.hk/index.aspx?langno=1&nodeID=2497.

Harrington, S. (2005, Aug. 27). Big class struggle to get IT just right. *South China Morning Post,* pp. E1–E2.

Hooper, S., & Rieber, L. P. (1995). Teaching with technology. In A. C. Ornstein (Ed.), *Teaching: Theory into practice* (pp. 154–170). Needham Heights, MA: Allyn and Bacon.

Jonassen, D. H., Peck, K. L., & Wilson, B. G. (1999). *Learning with technology: A constructivist perspective*. New Jersey: Merrill.

Kennedy, D. M., Fitzgerald, R., & Lee, K. T. (2004). Enacting government IT in education policy: Designing modules for teacher education in Hong Kong. *Journal of APEC Studies, 6*(1), 17–38.

Kennedy, D. M., & McNaught, C. (1997). Design elements for interactive multimedia. *Australian Journal of Educational Technology, 13*(1), 1–22.

Kozma, R. B. (2003). Technology and classroom practices: An international study. *Journal of Research on Technology in Education, 36*(1), 1–14.

Laurillard, D. (2002). Rethinking university teaching: A conversational framework for the effective use of learning technologies (2nd ed.). London: Routledge Falmer.

Leung, T. P.*, et al.* (2005). *Education quality work: The Hong Kong experience*. Hong Kong: Editorial Committee on behalf of the eight University Grants Committee (UGC)-funded higher education institutions.

McNaught, C., & Lam, P. (2005). Building an evaluation culture and evidence base for e-learning in three Hong Kong universities. *British Journal of Educational Technology, 36*(4), 599–614.

Pearson, J. (2001). Information technology in education: policy and provision in Hong Kong schools. *Technology, Pedagogy and Education, 10*(3), 279–292.

Rogers, E. M. (2003), *Diffusion of innovations* (5th ed.), New York: Free Press.

Sherry, L., Billig, S., Tavalin, F., & Gibson, D. (2000). *New Insights on Technology Adoption in Schools*. Retrieved November 28, 2005, from http://www.thejournal.com/magazine/vault/articleprintversion.cfm?aid=2640.

Yuen, A. H. K. (2003). Fostering learning communities in classrooms: A case study of Hong Kong schools. *Educational Media International, 40*(1-2), 153–162.