

INTEGRATING INFORMATION AND COMMUNICATION TECHNOLOGY INTO TEACHING AND LEARNING - A SECOND LEVEL COURSE FOR PROSPECTIVE TEACHERS

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ABSTRACT

Commonly, introductory-level courses on Information and Communication Technology (ICT) for prospective teachers focus on the development of knowledge and skill with the use of technology tools. These types of courses are very valuable and they undoubtedly enhance the teacher's ability to both promote and role model technological literacy for their students. The question that follows is, if one was to offer a second-level course to prospective teachers, what should that course be like? This paper describes such a course that was recently implemented in the Faculty of Education at the University of Alberta. The course extends the learners skill with technology, and introduces the notions of planning and design for online delivery. Most importantly, however, the course focuses on integrating ICT into teaching and learning.

KEYWORDS

Teacher education, information and communication technology, multimedia.

INTRODUCTION

It is widely accepted that information and communication technology (ICT) should be integrated into teaching and learning at all levels. This has been recognized since the introduction of the microcomputer in the early 1980's. Accomplishing this goal, however, has proven to be a very significant challenge. At a previous conference the author described experiences with a course called "Technology Tools for Teaching and Learning" (Wright, 2001). This university course for prospective teachers featured a web-based approach to the delivery of instruction on information and communication technology. Although one of the goals of this successful course was to emphasize integration, the major focus of the course was on developing a practical knowledge of ICT tools. The question that follows is, what should a second level course for education students be like that truly focuses on the integration of ICT? Such a course called "Interactive Multimedia" has been designed and is currently being implemented at the University of Alberta. While students do acquire further skill with ICT development tools, the major focus of this course is integration. Towards this end students are required to develop a multimedia-rich learning experience for their prospective students and for their developments to made available in a Web-based educational environment, specifically through WebCT[®] (Campus Edition 3.8). In this course, students have flexibility of choice over the development tools used - the focus is on the final outcome and on the integration of ICT into teaching and learning.

INTERACTIVE MULTIMEDIA - THE ESSENCE OF THE COURSE

"Interactive Multimedia", henceforth referred to as "the course", consists of thirty-six hours of instruction and thirty-six hours of laboratory experience. The course takes place in a computer lab and is scheduled as two, three-hour blocks per week for a twelve-week period. Although the course features a WebCT site and is supported by its own email account, it is not meant to be pursued by alternative

delivery (i.e., online). The class is taught face-to-face in a Macintosh environment although most if not all requirements can be addressed using IBM type personal computers (PC's). The prerequisite to this course is an introductory ICT course in which conventional basics are taught including the use of PowerPoint™ and Internet technologies. Typically, the first half of each class is considered to be lecture/demonstration time while the second half is considered to be lab time. In reality, class time is used flexibly and on some occasions, the entire three-hour block is made available for project work. It is both common and appropriate for introductory level courses to focus on the development of knowledge and skill in the use of ICT tools. Second level courses, for educators at least, should place more emphasis on the integration of technology into the teaching and learning environment and this is what the course attempts to do. This notion goal has long been recognized but its integration is still challenging.

The new course evolved from its previously mentioned precursor, Technology Tools for Teaching and Learning (TTTL). TTTL also attempted to emphasize integration in that students were required to complete three curriculum-related projects. In TTTL, students were encouraged to address the same topic on each of these projects. In part this apparent duplication not only served to control the workload for the students but also provided a better opportunity for students to compare three different development environments. Part of TTTL's mandate was to meet a program requirement that all education students complete a course on ICT. Because of this, TTTL also focussed significantly on the development of practical knowledge in the use of tools. First level, tools-oriented courses (such as TTTL) tend to narrowly define the software environment in an attempt to "keep things simple". Courses that focus on the use of ICT as tools are by far the most common and their objectives are very valid. Graduates of such courses can benefit personally from the use of ICT and should also be able to promote technological literacy among their students. Second level courses are more likely to incorporate the use of sophisticated multimedia development tools including presentation and web development software. These tools lend themselves to the development of instructional information systems. If we teach people the mechanics of developing web pages (and other information delivery systems) it should not be surprising that they will do just that - but with what quality? Using a tool to improve efficiency or to solve a problem is much different than using tool to develop a system that will effectively engage a learner. The latter is far more challenging. This being the case, second-level courses on ICT would do well to either create or require an awareness of planning and instructional design principles.

The course described consists of five modules and a class presentation as listed below:

Module 1	Multimedia Presentations – Planning and Design
Module 2	Capturing and Editing Multimedia
Module 3	On-Line Presentation 1
Module 4	On-Line Presentation 2
Module 5	Introduction to WebCT

CLASS PRESENTATION

The major outcome of the course is that students develop an integrated system that addresses a clearly identified aspect of the Alberta Program of Studies for kindergarten to grade twelve schooling. This system features components from fairly sophisticated multimedia PowerPoint and web site projects integrated under WebCT. As well, the system should show evidence of sound planning and design.

An interesting characteristic of the course is that, unlike its predecessor, students have a wide degree of choice in the development environments used. For example, students may choose from a variety of software tools and approaches to complete the development of their web site. These range from using basic HTML coding, simple shareware syntax editors (such as World Wide Web Weaver) and word processors, to sophisticated development tools such as FrontPage™ and Dreamweaver™. The following is a brief description of the modules and their intent.

Module 1 - Multimedia presentations – Planning and Design

In this course, the students will acquire significant knowledge and skill in the use of sophisticated software tools. This alone, however, does not ensure that the skills will be used to produce effective, quality learning resources. The purpose of this module, therefore, is to emphasize the need for planning and to introduce some basic concepts that can be embraced in the design and development of computer-based learning resources. The ASSURE model (**A**nalyze the learners, **S**tate the objectives, **S**elect methods, media, and materials, **U**timize media and materials, **R**equire learner participation, **E**valuate and revise) is discussed as an approach to planning in general. As a complement to the planning process, the use of storyboarding techniques to guide specific development such as screen/page design is also addressed. Instruction on fundamental design concepts deals with the effective use of; colour and texture; text, graphics, audio and video, and, very importantly, screen layout and the organization and sequencing of content. At this early point in the course, students have not undertaken any development work and thus their assignment at this stage is very simple. They are required to select and critique three online resources (web sites typically) within the context of the material covered in this module. A list of web sites is provided but students are not restricted to their use. The assignment is submitted electronically to the course WebCT environment.

Module 2 - Capturing and Editing Multimedia

In this module, students learn how to capture and edit multimedia elements such as graphics, sound and video. It is assumed that they are already familiar with the acquisition of clip art as well as graphics development and processing tools. A small amount of time is spent showing students how to create animated GIF images (or movie clip equivalents) using a variety of basic techniques. Though seemingly simple this activity provides an excellent first opportunity to emphasize some of the key objectives of the course - versatility, resourcefulness, and problem solving. The graphic that one might like to animate is often in the "wrong" environment. It is usually the wrong colour, size, and format and it almost certainly needs editing. The creation of an animated graphic from scratch provides the opportunity to experience a variety of different graphics development and conversion tools. After demonstrating some basic techniques, students are shown how to "find" animated GIF's and how to enhance them using tools that are readily available on the web. Students are always free to use other tools such as Fireworks™ and Flash™. Basic techniques are very valuable for those times when the web site that used to be there suddenly isn't or when tools such as Flash are not available. For evaluation purposes, students are required to submit two animated GIFs. The first GIF must be an original creation. The second GIF should be "found" and presented in two formats a) the original form and b) a version that has been scaled, rotated, re-coloured, and rendered transparent. All three GIFs are to be submitted to the WebCT course environment on an appropriately named, single-slide PowerPoint presentation.

In this module, students learn a variety of methods of capturing and editing sound from both microphones and CDs. They also learn how to capture, convert, and edit video information. For evaluation purposes, students are required to submit an approximately thirty-second, captured video clip that features their own voice as well as sound captured from a CD. This video clip must feature a title, a transition, and the appropriate use of fading techniques. As well, it should be in a compressed format. Students are also actively encouraged to locate useable sound and video resources through other means (usually, via the Internet).

Module 3 - On-Line Presentation 1

Module 3 represents the first of three major projects in the course. This project entails the development of a sophisticated, curriculum relevant, approximately fifteen slide PowerPoint presentation. In addition to meeting the size requirement, student presentations must:

- reflect the use of all "basic" PowerPoint features
- include at least two linked PowerPoint files
- contain content is valid, informative, consistent with the chosen topic
- be referenced to the Alberta Program of Studies
- be logically sequenced, and referenced if appropriate

- reflect content accuracy and integrity
- embrace a communication style consistent with the target audience
- be grammatically correct
- contain links to a minimum of two contextually relevant web sites (using hyperlinks and action settings)
- incorporate graphics/backgrounds, sound, and video/animations
- limit the size of individual multimedia elements to 2Mb or less (typically, this implies compression).

Presentations must be user friendly and easy to navigate and they must run smoothly (i.e., no crashes, error messages, or calls for resources). A typical user should not get "lost" or "confused", navigation should be explicit or highly intuitive. All links must be active and operational. In addition to the specified criteria, presentations are evaluated on overall impact and the extent to which they reflect the use of advanced PowerPoint capabilities and features (e.g., animation both on and off the screen, narration). Students are required to upload their PowerPoint project and all related resource files to WebCT for evaluation purposes.

Module 4 - On-Line Presentation 2

Module 4 requires the students to develop a curriculum relevant, six-page (minimum) web site. The information presented by the web site must meet standards and criteria similar to those contained in the PowerPoint presentation. In addition to contributing to the overall learning objectives, the web site project must also:

- include a bookmark file that contains links to at least six relevant external sites
- contain at least three embedded links to external sites
- employ hard-coded relative (internal) links (minimal reliance on the use of the "back" button)
- utilize bookmark links and active menus for multi-screen pages
- incorporate at least one client-side image map
- incorporate effective use of tables as a formatting technique
- demonstrate the use of frames
- be posted to a defined university server (i.e., be publicly accessible via a URL)
- be technically efficient and effective (e.g., use of "alt", interlacing, compression)

Although the web site projects are evaluated by accessing them via their URL's, students are also required to upload their web site projects to WebCT. The purpose of this upload is to demonstrate that the web site can operate as a resource that is effectively internal to WebCT.

Module 5 - Introduction to WebCT

WebCT (short for WebCourseTools) is software that can be used to create entire courses online or to complement a classroom-based course. WebCT software resides on a server and allows instructors and their students to access it via a Web browser, such as Internet Explorer™ or Netscape®. This module not only provides an introduction to WebCT but also provides the infrastructure or umbrella under which all other student projects are integrated to form a system. In the process, WebCT is used to add more content and value to the final outcome including quizzes, email, conferencing and access to other web-based resources. All students at the University of Alberta have access to WebCT since it is supported as a campus-wide resource. What this means is that they have access to all courses that are available via this tool. What is profoundly different in the course being described is that the students are assigned their own course complete with designer/developer privileges. A single, fictitious student is registered in each of the students' courses so that both they can view their work from both the designer and user perspectives. Student courses are still associated with the parent course . This means that both the instructor and teaching assistant can also access the student courses either from the designer or (fictitious) student perspective. The use of a single (fictitious) student also allows all students to access the work of their peers from a user/learner perspective. This is particularly useful during the class presentations when fellow students can log in and follow along with the presenter. In

completing this module students are required to demonstrate proficiency with many WebCT generalities as well the use of the Calendar, Syllabus, Course Content, Content Assistant, and Test tools. The essence of the WebCT project is conveyed by the evaluation criteria shown below. Student projects must at least:

- demonstrate the effective use of the file manager (a multitude of files are to be uploaded)
- display an appropriately organized home page (with options available in both the menu and icon areas) and with at least one custom labeled link
- use the Calendar tool to create at least two basic entries for a specified month as well as access to the University of Alberta Code of Student Conduct web page
- provide access to a lesson plan or equivalent that was created in Microsoft Word (or equivalent) and saved as an HTML resource
- Use the Syllabus tool to create a lesson plan or course outline or equivalent page that:
 - features both standard and custom sections
 - incorporates text in different font sizes and colours
 - includes a short biography that incorporates an embedded (scanned or digicam generated) image
 - uses the embedded image as an active link to another object
 - links directly to a bookmark file (i.e., not indirectly via the web page project)
 - accesses an externally generated HTML file (e.g., the Microsoft Word file)
- Use the Content tool to:
 - access at least one page of new content (i.e., not the PowerPoint or web site content)
 - to create link to their web site via its URL
- access the PowerPoint project
- access externally generated sound, image, and video resources
- access to a self generated planning document (e.g., a storyboard)
- Use the Content Assistant to provide access to external web sites
- Use the Self Test tool to create a test that features three different types of question (minimum of six questions)
- Demonstrate the use of HTML or equivalent to customize or extend the boundaries of WebCT capability

The Module 5 integration project is shown in schematic form in Figure 1.

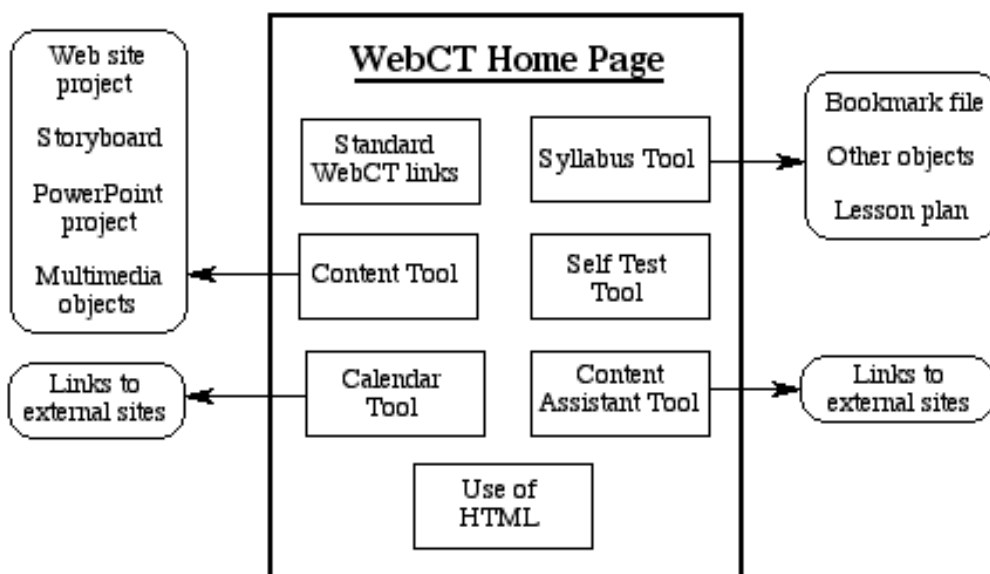


Figure 1. Schematic of Module 5 integration project

In evaluating the WebCT project, emphasis is placed on proficiency of use, new content, and, very importantly, on the manner in which integration has been approached. Content contained in previous modules is necessarily evident in the project but is not re-judged.

Class Presentation

In the last week of the course, each student is required to deliver an approximately twenty-minute presentation of his or her work to the class. This is done for several reasons. First, as prospective teachers, it is beneficial for students to be provided with as many opportunities as possible to enhance their communications skills. Second, the presentations provide an opportunity to learn from each other's efforts. Third, the presentations support the evaluation of students' work. By design, student presentations are driven by the WebCT project. Because twenty minutes is a very short period of time in which to represent accomplishments from an entire course, students are asked to present only the essence of their work. This component of the course contributes ten percent towards the course final grade. Presentations are judged in three major categories notably:

- purpose and communication (what was the purpose of the project, what is the link to the curriculum and who is the target audience? How clearly were the goals and objectives communicated?)
- Effectiveness of the presentation (preparedness, clarity, smoothness and articulation, sequencing and timing etc.)
- Interactivity (the effectiveness with which peer questions and interactions were addressed)

DISCUSSION

Overall the first implementation of the course appears to have been very successful, particularly in terms of achieving the original instructional goals. One of the advantages of the course described is what it is not. It is not a beginner-level course and it is not a required course. What this implies is that students have self-selected their way into the course. This in turn implies that those who take the course are either like ICT, are good at it or, at the very least, are positively inclined towards it. Typically, such students have a higher level of tolerance towards the "technological gremlins" that often give rise to inexplicable outcomes.

As with most innovations in the area of ICT, many challenges were encountered though all were resolved. Some of these challenges were small and some were not. The smaller challenges are exemplified by a web page that runs on the latest release of a specific browser on the Macintosh computer yet does not run successfully on the latest release of the same browser on a PC in the lab next door. One of the potentially more significant challenges (that was anticipated) did not arise to a great degree - but that does not mean it won't the next time around! Specifically this refers to challenges associated with allowing students (encouraging them even) to use the development tools of their choice. There are two things to consider here. First, there simply is not time in the course to teach about several different tools (for the development of web pages for example). And even if this had been done, the instruction would likely have benefited only a subset of the students. Second, an instructor could feel discomfort by not being an expert in the spectrum of tools. These prospects were acknowledged up front and the students were reminded that they would need to be resourceful. They were advised that neither the instructor nor the TA would necessarily have instant answers to all of their questions. This latter fear was not well founded since students tend to use tools that they are either already familiar with or that they are motivated to learn about independently. In short, the students were more self-sufficient than was anticipated.

In all project work the students are encouraged to go above and beyond the basic requirements. In this regard, students are advised that they can add value to their work by either doing something interesting with innovative uses/combinations of basic techniques or by acquiring and employing more advanced knowledge and skill. Students are reminded that a higher degree of resourcefulness and self-reliance is required when pursuing additional credit. In evaluating student work it is often easy to overlook something that either required great effort or that was innovative. This is particularly true with the

development of web sites. Because of this, students are encouraged to include a "read-me" file with each project that draws attention to accomplishments that they feel exceed minimum requirements.

In the unit on web site development, basic HTML coding was taught even though the use of development tools (such as Dream Weaver) was advocated and supported. This was particularly useful since this knowledge allowed the students to customize their WebCT project.

An original intent of the course was to have students record all of their work on a CD as a portfolio. In the end, however, this was not done since all work was integrated under WebCT and thus more readily available to peers. Instruction on how to "burn" CD's was, provided, however, though most students already knew how to do this.

Finally, the administrative and instructional support overheads for the course were predictably high.

REFERENCES

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