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**EduTOOLS:
A DEVELOPMENT OF ON-LINE TOOLS FOR PROJECT WORK**

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Abstract: In an effort to spearhead the use of IT for education, the Centre for Learning Technologies, which is jointly set up by the Ministry of Education, Kent Ridge Digital Labs and Infocomm Development Authority, has embarked on an R&D project named eduTOOLS. This project aims to provide teachers and students a suite of on-line tools for project work. For the teachers, the use of these tools could help them monitor and assess students' project work processes and products. For the students, these tools could help them collaborate on-line in their project work with other group members. Also available to students are a collection of recommended project resources and a list of experts. This paper reports on the development of eduTOOLS by examining the conceptual and technical aspects of each tool. The discussions bear implications to the use of IT for project work and some pertinent issues for consideration.

Background

Two recent changes in Singapore's education can be traced to this R&D project of an innovative way of using information technology (IT) for project work (PW).

In April 1997, a master plan for using IT in schools was launched. The aim is to make learning with computers a way of life in the classroom. Initial concerns were focused on increased availability of, and access to computers in classrooms, but the provision of computers and peripherals to schools has progressed well over three phases of implementation from 1997 to 2000. A more critical and on-

going concern of educators is the generation of innovative processes for using computers in teaching and learning. For many educational researchers and curriculum developers, they envisage a wide range of possibilities with computer technology in formulating innovative curricula designs, instructional and learning strategies and assessment methods.

In January 1998, a new university admission system was proposed. Considered as a significant change in the education structure, the admission criteria will include a reasoning test, project work and co-curricular activities to supplement the A-Levels in the admission process from 2003. The rationale for project work is to provide students with an integrated learning experience to develop various skills such as those of creative and critical thinking, oral and written communication, collaborative learning, self-directed inquiry and life-long learning skills.

Thus, in an effort to spearhead the use of IT for education, the Centre for Learning Technologies, which is jointly set up by the Ministry of Education, Kent Ridge Digital Labs and Infocomm Development Authority, embarked on this R&D project named eduTOOLS in 1999.

What is eduTOOLS?

The underlying concept of eduTOOLS is a virtual meeting place for teachers and students for the purpose of project work. It provides a convenient open and secure channel for exchange of ideas, information and instructional resources.

For students, eduTOOLS provides a shared space on the Internet to do collaborative project work. That is, they can work together in a virtual classroom, participate in discussions and share study tools for research. For teachers, eduTOOLS provides a real-time but virtual classroom to perform most of their administrative and instructional functions of project work.

In sum, eduTOOLS is a web-based collaborative teaching-learning environment for both teachers and students to do project work.

Conceptual Design of eduTOOLS

A working team comprising software developers from KRDL and staff members from the Education Technology Division (ETD), Curriculum Planning and Development Division (CPDD) and Research & Testing Division (RTD) of the MOE first conducted a comprehensive assessment of project work requirements and its typical flow of work. Secondary and junior college teachers were consulted in this process. Based on this needs assessment, the eduTOOLS project was conceptualized and designed. Figure 1 shows the project design.

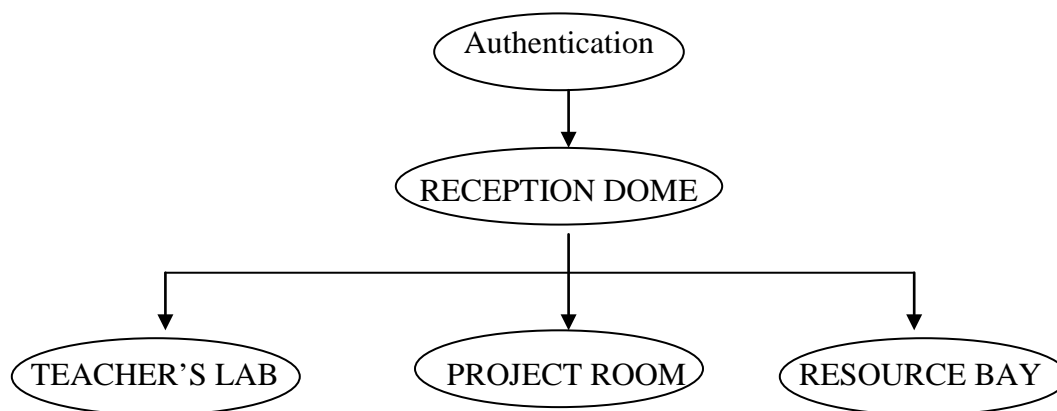


Figure 1: Design of eduTOOLS

EduTOOLS is designed based on a concept of meeting places for communities of learners. To use eduTOOLS, a student or teacher first performs a login authentication based on a given user identification and password. Access to eduTOOLS is strictly by membership; and access rights to students are granted and administered by a system administrator. Once the login is successful, the student or teacher enters into the RECEPTION DOME. At this meeting place, users can read community notices that are posted on the public notice board. There is also the information on the number of eduTOOLS members and the number of project members who are currently online.

The TEACHER'S LAB is a meeting place for teachers only. Here, they are able to perform administrative tasks of setting up a new project for their classes, to work with other teachers in drafting a project, and to examine and assess students' submitted projects.

The PROJECT ROOM is a meeting place for students. Here, they can use a number of communication tools to work collaboratively with other group members, and they can also store their resources and work in assigned folders. For teachers, they are able to monitor students' on-going projects here.

The RESOURCE BAY is a one-stop place for searching learning and research information. For instance, there is the category of resource for suggested themes for projects with sub-categories for multimedia, experts, related links/web-sites, printed materials (bibliographies) and other audio & visual materials. Another category of resource is the MOE's project work resource pack for the secondary

and junior college levels. Resources can also be searched from various online library catalogues. For this, the URL links to the National Library network (NLB) and to the MOE's integrated Libraries network (Merlin) are provided. In addition, there are URL links to the major WWW search engines such as Yahoo, Excite, AltaVista and others.

Specific Web-Based Tools

Eleven web-based tools were developed for facilitating students in their project work. Table 1 provides a list of the tools and the function of each tool.

Table 1.
List of Web-Based Tools and Its Functions

TOOL	FUNCTION
Project Cabinet	A shared folder for storing project resources.
My Cabinet	A personal folder for storing resources.
Shared Mind-Tool	A collaboration platform where two or more students can construct knowledge.
Chat	Facilitate synchronous communication between two or more users.
Forum	Facilitate threaded asynchronous discussion between two or more users
To-Do List	A to-do list for project and personal tasks.
Notice Board	For announcing messages to the community of eduTOOLS members.
Webmail	A personalised electronic mail service
Pager	For contacting on-line members
Calendar	A web-based calendar that records three levels of events – the community calendar, the personal calendar and the project calendar
Address Book	A common address book for the Webmail.

How does eduTOOLS facilitate Project Work?

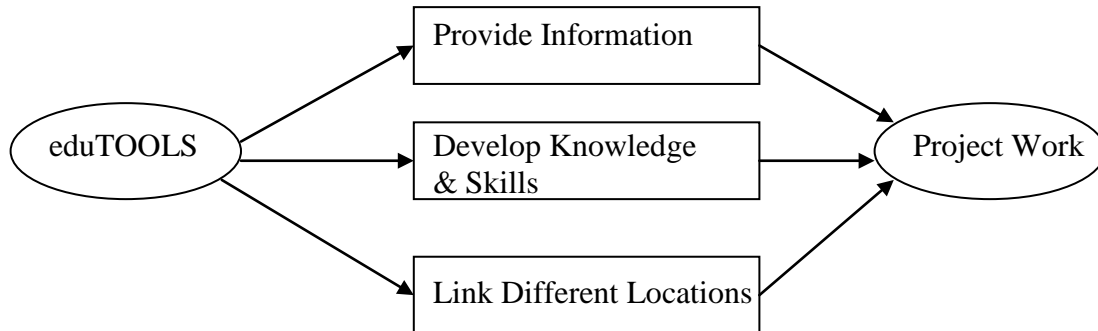


Figure 2: Roles of eduTOOLS for Project Work

According to Hackbarth (1996), an educational technology is a systematic process of developing solutions to problems of teaching and learning. For eduTOOLS, what are its scope and promise as an educational technology for project work? Three main roles of eduTOOLS can be delineated (see Figure 2). These are: (i) provision of information, (ii) developing knowledge and skills and (iii) linking different locations. Table 2 shows an analysis of the functions performed by each web-based tool in eduTOOLS.

Table 2
An Analysis of the Functions Performed by Each Web-Based Tool

Web-Based Tools	Functions		
	Provide Information	Develop Knowledge & Skills	Link Different Locations
Project Cabinet	4		4
My Cabinet	4		
Shared-Mind Tool		4	4
Chat		4	4
Forum	4	4	4
To-Do-List	4	4	4
Notice Board	4		4
Web Mail	4		4
Pager			4
Calendar	4		4
Address Book	4		

One basic role of an educational technology is the provision of information. Several web-based tools in eduTOOLS act as repositories of information where stored data are easily accessed by users. MY CABINET is a student's personal folder for storing resources; and PROJECT CABINET is a shared folder for members in a project team. Other tools such as FORUM, TO-DO-LIST, NOTICE BOARD, WEB MAIL, CALENDAR AND ADDRESS BOOK allow students to store or to retrieve different types of information for different aspects of their work. The computer's unique capabilities for data storage and data management are thus well harnessed for information provision to help students in doing collaborative project work.

Pedagogically desirable of an educational technology is the role of developing knowledge and skill. Four web-based tools are deemed to perform this function of assisting students in learning content and in developing problem solving and data analysis skills. These include SHARED MIND TOOLS, CHAT, FORUM AND TO-DO-LIST. Also, these tools have some interactive capabilities to respond to inputs from learners.

A final role of eduTOOLS as an educational technology is its ability to link different locations. Nine web-based tools help establish two-way communication amongst users where they can communicate directly in real time (e.g. CHAT) or delayed time (e.g. FORUM, WEB MAIL). The provision of different communication lines in eduTOOLS emphasises the concept of a virtual meeting place for students to do collaborative project work.

Discussion

Preparing for the new knowledge-based economy of the 21st century is the crux of the matter for project work. It is envisaged that project work provides an integrated learning experience and this is desirable as an area of learning for students as it helps develop the attribute of versatility to transfer ideas from one context to another and to make creative connections between different fields.

However, there are several problems with collaborative project work in schools. For students, there are problems of good, reliable and updated resources, time constraints for group meetings and effective communication with members. For teachers, there are administrative problems of effective monitoring of group processes. The web-based tools in eduTOOLS provide some technological solutions for making project work more individualised, valid and accessible. These solutions are realised through three main roles of eduTOOLS, namely, provision of information, developing knowledge and skills, and linking of different locations.

The scope and promises of eduTOOLS as an educational technology for project work remain to be better understood. Investigation studies are needed to understand some pertinent issues regarding the use of web-based tools for project work in terms of student characteristics (e.g. sex, age, IT skills and working behaviours on the computer), the nature of learning with project work within various contexts, as well as about interactions among these elements.

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