Facilitating teaching and learning resources through the World Wide Web - case accounts of industrial design and living technology education in Taiwan

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Abstract
Designers have a key role to play in exploring the potential uses of technology, understanding and managing its impact on society, and ensuring that it is accessible, usable, and useful. There are a number of resources on the Internet aimed specially at students and faculties. The Internet provides access to the World Wide Web, Usenet, Ftp, and Telnet, which have tremendous educational potential. The World Wide Web has more appeal, because of its hypermedia foundation, its access to an immense volume of rapidly evolving information, and its access to the latest information. Because of all these characteristics, the World Wide Web becomes a potent tool for educational purposes.

This paper discusses these features of the Internet and its application to teaching and learning, possible sophisticated pedagogical uses of the web, and notes web-based content for assisting both industrial design and living technology education in Taiwan. There are 18 universities offering Industrial Design at undergraduate and postgraduate level in Taiwan; Living Technology, the course title for technology education in Taiwan, is a requirement for secondary students. The bases of this research are archival study, on-line searching, and focus group panel discussions. Finally, the strategies of implementing web-based content are presented in brief case accounts.

Keywords: industrial design, world wide web, learning resources, case account, living technology

Introduction

In February 1997, America's President Bill Clinton issued a "call to action" for the government and people of the United States in order to "prepare America for the 21st century." Clinton argued that every 12-year-old must learn how to access the Internet and that every classroom and library should be connected to the Internet by the year 2000.

The Internet is a network of networks: the international linking of tens of thousands of businesses, universities, and research organizations with millions of individual users. It is what United States Vice-President Al Gore first publicly referred to as the information superhighway. In other words, the Internet is a general communications infrastructure that links computers together, on top of which the Web rides.

Pierre Levy (1995) considers Cyberspace to be humanity's most recent major manifestation of a collective intelligence-inducing object. By contrast, everyone in Cyberspace is potentially at once a receiver and emitter, and this in a space that is at once qualitatively differentiated, flexible, ordered by the participants themselves and explorable. The World Wide Web is a carpet of signification, woven by millions of people and constantly being returned to the loom. Out of this permanent, ongoing connection of millions of subjective worlds (Websites) arises a dynamic, common, "objectivated", and navigable memory. The excitement aroused by the Internet is due every bit as much to the dazzling sensation of plunging into a common brain as to its utilitarian potential for information search.

Don Doucette (1998) believes the new challenge to universities will be to discover new ways to "provide learning support

services to help students learn, regardless of where they get their information."

Stephen C. Ehrmann (1998) views technology in higher education as being akin to a four-level tower in which each level is progressively more sophisticated than the one below it. The ground floor contains traditional technologies (textbook, audiovisual materials) and the infrastructure for their use (libraries, labs, etc.). These basic elements support the four traditional pedagogies on the first floor: directed instruction (lecture hall and textbooks), learning by doing (laboratories, typewriters, libraries), real-time conversations (seminars, office hours), and time-delayed exchange (homework). The second floor houses enhancements to these practices that require students to use instructional technologies. Finally, the third floor represents large-scale structures supporting new educational concepts, campus-based education and distributed learning.

The Internet is an electronic gateway to learning resources and a powerful tool for engaging minds. It is through interaction with other people, ideas, and new experiences that we all construct new knowledge, and the power of the Internet is in its capacity to enable interactions with people over great distances and link people with distant informational resources. Therefore, it is high time for university faculty, administrative, and staff to use communications and information technologies to make possible new approaches to the teaching and learning process, for tutoring and enriching students, and as learning tools.

There are four major kinds of pedagogical uses of the World Wide Web:

1 The World Wide Web is acting like an Information Desk. Through the Internet, students and instructors with limited resources can access an extensive array of informational sources. There are times when each of us needs help finding specific information, learning new concepts, completing assignments, or making plans. On the Web, personal assistance is only a click away.
2 It can provide support and services for schools, teachers and students to fully utilize the Internet.
3 It can be used in classrooms. Using electronic mail, an instructor can interact individually with students or their parents, send informational messages to a whole group, or provide assistance and access to electronic resources through a personal website. The Internet also makes it possible for a class or group to interact with other school groups at great distances. Finally, special interest discussion groups on the World Wide Web enable students and instructors to interact with others around the world that share interests. One way to keep students interested in design and technology is to help them notice the design and technology of daily life.
4 It can facilitate on-line courses. The World Wide Web provides websites offering activities, information, and media to nurture self-directed learning and active research efforts outside the classroom.

Background

In July 1990, Taiwan's Ministry of Education cooperated with major national universities to set up the Taiwan Academic Network (TANet) (http://w3.cc.ntu.edu.tw/TANet/), which established the backbone and regional network framework with research-related Information Infrastructure. The TANet includes three levels of networks: the first level – national backbone network, which connects to other two mainly nationwide networks – HiNet and SeedNet; the second level – regional networks; and the third level – local area networks (LANs) on campus (Figure 1). Based on Internet TCP/IP, the TANet provides such application as E-Mail, FTP, Telnet, Netnews, BBS, IRC, Gopher, WAIS, WWW, and Archie. With the fast advance of communications and information technologies, the population of user group of the Internet grows dramatically every year.

In order to help students to decide which course program is most suitable to developing their potential, the Ministry of Education asked every university to set up an on-line prospectus. And almost all universities demand students to reserve courses via the Internet. Only a few instructors, however, provide course content on the Web.

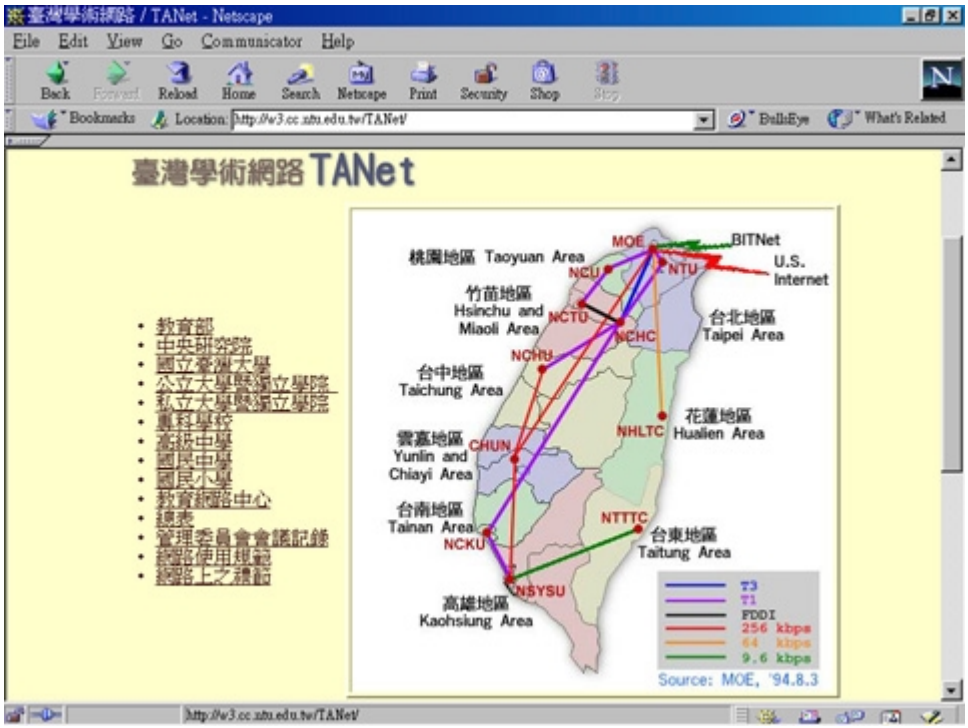

Figure 1 TANet provides national backbone/regional/local area networks

Case History I – Industrial Design Education

In 1961, China Productivity & Trade Centre (CPTC) invited American Professor Alfred Girardy to Taiwan to introduce Industrial Design. Two years later, CPTC retained experts from Japan to consult on industrial design practice and education. In 1964, Taiwan's first 5-year programme of Industrial Design was established in Ming Chi Institute of Technology. After that, six Institutes of Technology set up Industrial Design programmes. The China Industrial Designers' Association was organized in 1967, and the *Journal of Industrial Design* was published meanwhile. From 1970 to 1979, five Institutes ceased their Industrial Design programmes. After this period of hardship, Taiwan's Industrial Design education started, from 1986, to revive. In the 80s and 90s, around 15 institutions offered Industrial Design programmes in Taiwan.

The Design Centre of China External Trade Development Centre set up a website (http://www.designcenter.org.tw) to provide design information to industry and the general public (Figure 2). Now there are a lot of websites that contain information about industrial design. Among them, the Furniture Industry Information Web (http://www.ntut.edu.tw/~tylin) is particularly outstanding and deserves further description as a case history (Figure 3).

In 1996, Lin Tong Yang, Associate Professor of Industrial Design of National Taipei University of Technology, thought deeply about the significance of furniture industry information, and began to establish his personal website to organize furniture information systematically, professionally, and publicly. The website was intended not only for designers and students, but also for as wide a public as possible. The web content is divided into two main parts:

- Furniture Engineering Lab, which facilitates teaching and learning resources, such as bibliography, publications, technical reports, furniture appreciation, best practice, training and research links (Figure 4).
- Furniture Information Broadway, which was tailored for the general public and classified as Introduction to furniture, design and style, materials and hardware, process and manufacturing, market information, association and organization,

Figure 2 The Design Centre's Homepage

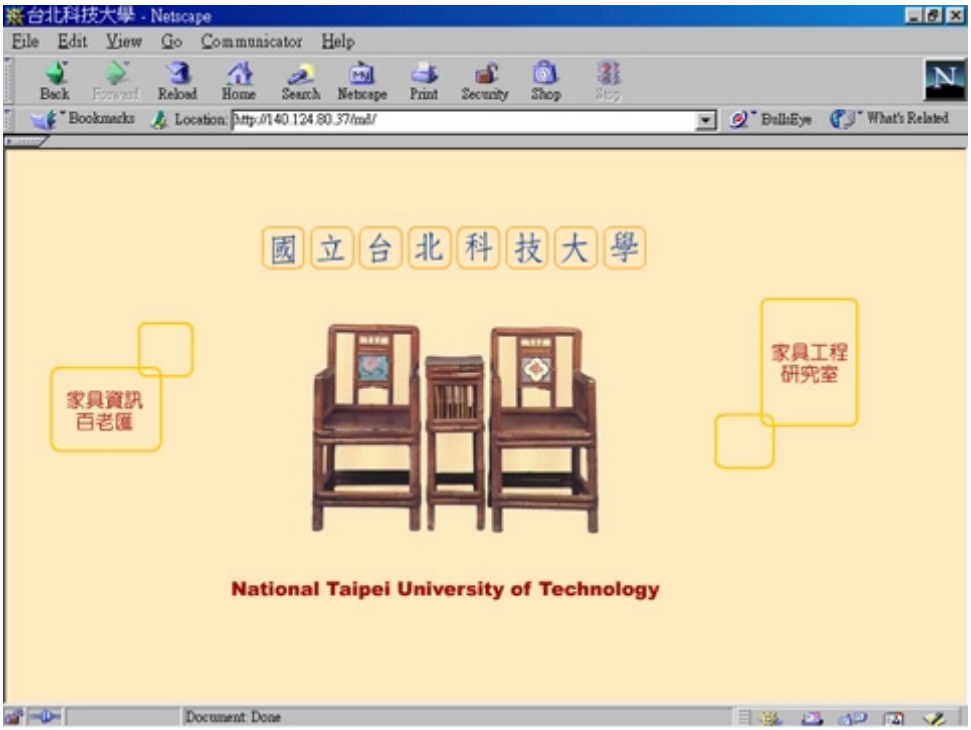

Figure 3 Tong Yang Lin's first Taiwan Furniture Industry Information Web

and resource links (Figure 5).

Lin is encouraged by feedback and an average 10-hit daily. He keeps on updating and enriching his web pages on a regular basis (http://140.124.80.37/md/).

Case History II – Living Technology Education

As Tsai and Yang (1999) presented in IDATER 99, several forces have driven the revisions of the national curriculum for elementary and secondary schools in Taiwan. These include

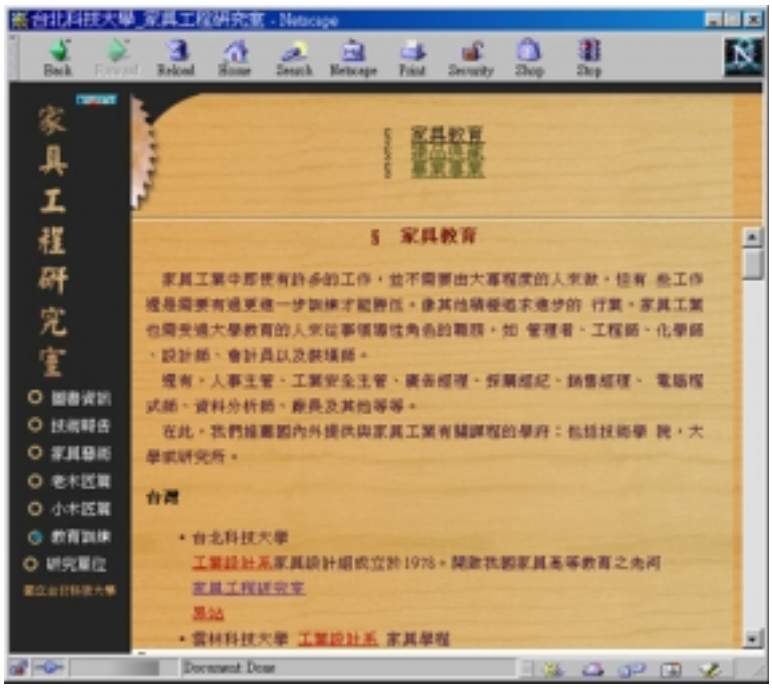

Figure 4 Lin's Web Pages - Furniture Engineering Lab

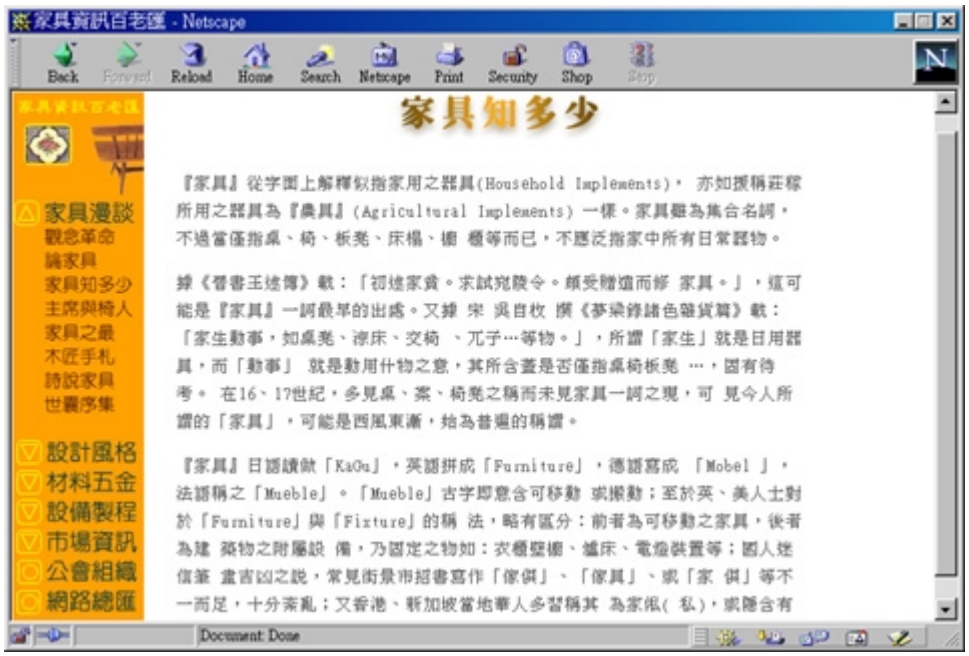

Figure 5 Lin's Web Pages - Furniture Information Broadway

public involvement in education, changes of economic structure, and global influences. Living Technology, the course title for technology education in Taiwan, is a requirement for secondary students announced in 1994. The new curriculum for junior high schools was implemented in September of 1997. Many efforts including public hearings, teacher in-service training, researches, publications, conferences, purchasing equipment and school evaluation have been made to implement the new curriculum.

The Bureau of Education of Taipei City commissioned several junior high schools and cooperated with the Institute for Information Industry to establish online resources for

teaching and learning (Figure 6). The second case history discusses the web content of Living Technology, in terms of website structure, design and content, and implementation strategy (http://www.csps.tp.edu.tw/Digitalbook2/juniorhigh) (Figure 7).

The goals of Living Technology for junior high schools are as follows (Ministry of Education, 1994):

1 Understanding of the meaning, evolution,

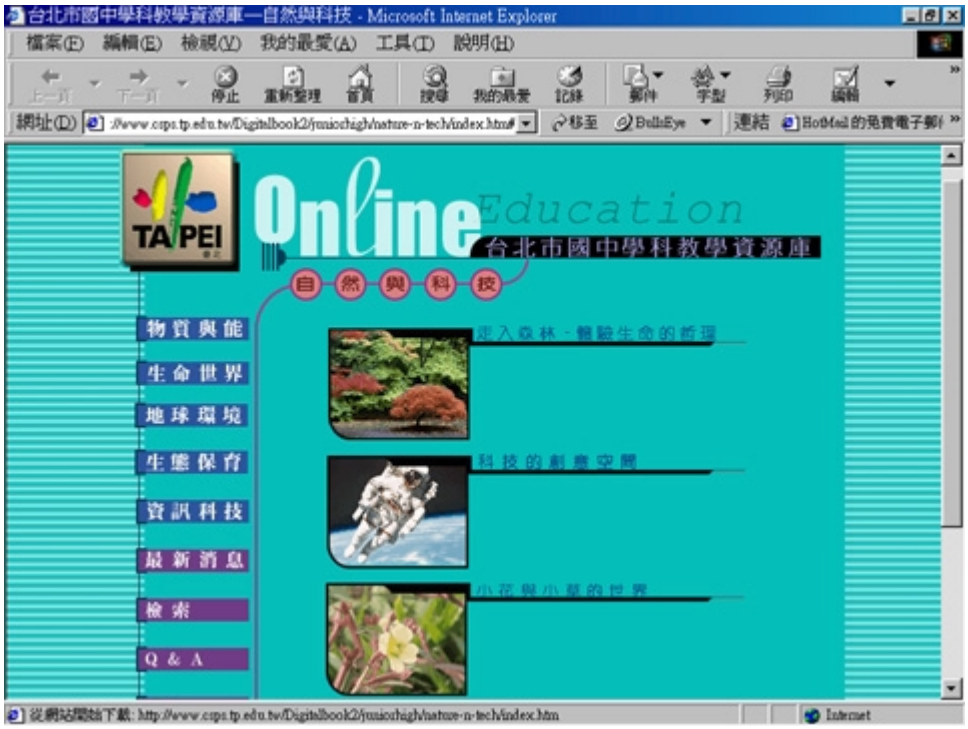

Figure 6 Taipei City's Online Resources for Junior High Schools

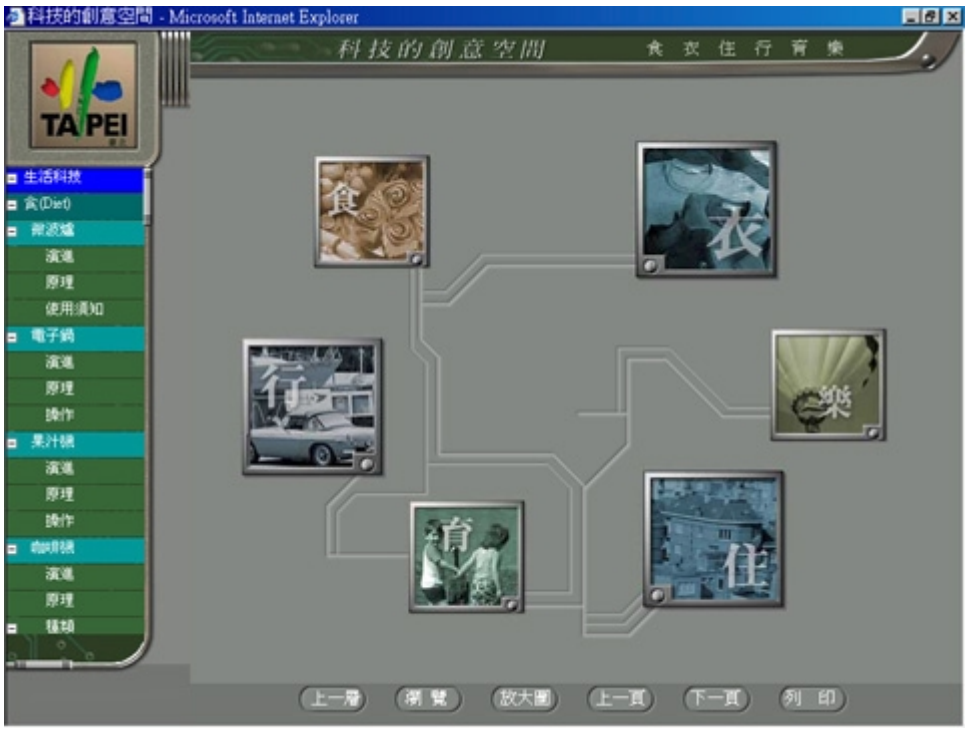

Figure 7 The Homepage of Living Technology

scope and importance of technology as well as its impact on human life, society and culture.

2 Being able to use basic tools, equipment, materials, products, processes and methods of technology.

3 Knowing the disciplines and occupations related to technology and exploring one's own interests, aptitude and talents in certain aspects of technology.

4 Increasing the abilities of adjustment, judgment, problem solving and creative thinking for living in a technological society.

In order to approach these aims, it is necessary for us to analyse the rhetoric of technology, (for which we need a new science-based area within the fields of design). This is interface design. The equipment of our everyday life is becoming increasingly smaller and more intelligent. There is hardly any basic commodity left in which there is no chip installed. This continual progress of micrologisation and electronisation of things is changing almost everything people deal with into 'black boxes', or into something we use every day without understanding how it works. Digitalisation has unfolded world data on a single gigantic surface. The digital iron presses things into depthless information. Nowadays the depthless surfaces teach us to trust our senses again. People believe that interactive things are basically more fun if you can just click and do something; it's just more enjoyable as an experience.

What is important is the content. Whereas the traditional graphic designer might work with fonts and colours, the interactive designer has to deal with things like time and responsiveness and elements such as the cursors or the sound effects that happen when someone clicks on something. This is thinking about interactivity as a really fun way of learning about things.

Based on this rationale, the online resource of Living Technology was designed to allow students to manipulate things and play with them but, at the same time, give relevant content information as well. Fun is a learning tool, so by playing these things, hopefully, they'll remember more (Figure 8).

The Artist-Designer's Approach

The implementation strategy might be called the artist-designer's approach. Fine artists set their own agenda in terms of aim and process,

Figure 8 The Web Pages of Living Technology

while engineering-designers are more concerned with *how* to make things work, than with *what* is made to work. But artist-designers, while working to the agenda of others, use the approaches of people's understanding of visual languages, to design things which are both satisfying and useful – reconciling, as David Pye (1978) neatly put it, the requirements of use, economy and appearance.

Conclusion

This paper has discussed those features of the Internet and indicated its application to the teaching and learning resources, possible sophisticated pedagogical uses of the web, and the establishment of web-based content for assisting both industrial design and living technology education in Taiwan. The strategies of implementing the web-based content as case history were presented. The first one is intended for Industrial Design, particularly furniture design. The second is directed to Living Technology, specially tailored for junior high schools' teachers and students. As shown by the experience of these interactive web content designs, it is highly recommended that people should start to use the tools that are available now to create non-linear content, which is actually much more intuitive and much more the way people have always thought.

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