

**WEB-BASED TRAINING IN TAIWAN**

by

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## ABSTRACT

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The use of Internet is dramatically rising in organizations for various purposes such as communication, researches, and training. Web-based training (WBT) is a new training method, where instructional material is delivered via the World Wide Web. WBT is an anytime-anywhere training method, which is the only way to bring new and current employees up to speed on new information and technologies without spending a lot of time and money in the process. WBT is increasingly used as a new training method in the United States and Europe, due to the long distance between branches. However, WBT is still a novel concept for most Asian countries.

This study is to examine companies in Taiwan, an Asian country of narrow domain but with lots of high-tech industries, on their training capabilities, current implementations, plans, and attitudes that pertain to WBT. A mail survey was conducted for collecting the data for this study. One hundred and sixty-two

questionnaires were sent to companies located in Hsinchu Science-based Industrial Park (HSIP), and ninety-one completed and valid questionnaires were returned throughout this study. The overall response rate was 56 percent.

From the findings of this study, it can be concluded that the companies that located in HSIP plan to implement WBT in the near future. They have capacity to adapt WBT based on both capable hardware and software and also the popular usage of the Internet. The implementation of WBT is not yet popular in Taiwan; however, according to the interest of the respondents, we can predict a trend towards the usage of WBT on account of its convenience, immediateness, and consistency.

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## **CHAPTER ONE**

### **INTRODUCTION**

In this speedily changing global market, in order to be competitive and successful, companies have to manage strategically, and train employees continuously. As information is doubling every five to seven years (Hendrickson, 1998), organizations have been recognizing the value of human knowledge as a resource, and also the need for employees to update their knowledge and skills periodically. However, the traditional training encounters many challenges while trying to meet these needs. First of all, time away from the job for training interrupts productivity. Secondly, a classroom-delivered course cannot provide information needed immediately. Finally, it is difficult for traditional classroom training to offer the consistent content of training. To solve these problems, organizations are increasingly relying on WBT that can provide immediacy, convenience, and consistency of training (Colbrunn & Dan Tiem, 2000).

The use of the Internet is dramatically rising in organizations for various purposes such as communication, researches, and training. WBT is an increasingly used new training method that delivers instructional material via the World Wide Web. WBT is an anytime-anywhere training method, which is the only way to bring new and current employees up to speed on new information and technologies without

spending a lot of time and money in the process (Mottl, J. N., 2000). Although the cost of developing WBT programs is approximately three times higher than that of classroom training, WBT has the ability to transport training programs electronically all over the world, make changes as often as needed, centrally and at minimal cost, and track training results electronically (Boisvert, 2000). These benefits drive many organizations to make the initial investment.

The main purpose of training is to help employees maximize their potential, effectively utilize their skills, improve their performance, and to increase an organizations' productivity. The traditional training, such as on-the-job training and classroom training, takes employees away from work. On the contrary, WBT makes learning more convenient for learners by bringing it nearer the learner (Hendrickson, 1998). As training methods change, the role of the trainer changes from the training designer or provider to the training method selector and facilitator (Boisvert, 2000).

### **Purpose of the Study**

WBT is increasingly used as a new training method in the United States and Europe, due to the long distance between branches. However, WBT is still a novel concept for most Asian countries. This study is to examine companies in Taiwan, an Asian country of narrow domain but with an abundance of high-tech industries, on their training capabilities, current implementations, plans, and attitudes that pertain to

WBT. This study will survey companies located in the HSIP which is the most important high-tech area in Taiwan. High-tech industry has always been the pioneer of Taiwanese industry for the development of new technologies and ideas; therefore, by surveying these companies, this study will provide the most accurate information on the trend of WBT usage in Taiwan.

As change is necessary, but not always simple, for organizations, they have to consider their readiness and ability before adapting new technologies or making changes. To succeed in using WBT, it is important to consider the issues related to the organization's culture and technology (Colbrunn & Van Tiem, 2000). This is critical for most Taiwanese organizations because they are used to the hierarchy and dislike changing too much. With the results and recommendations of this study, not only can companies understand the trend of WBT usage in Taiwan, but also what kinds of technology and attitude are supportive of WBT.

### **Objectives of the Study**

The objectives of this study are as follows:

1. To identify the trends of companies located in HSIP which have access to the Internet.
2. To identify the trends of companies that currently implement or plan to use WBT.
3. To identify the current training methods most commonly used.

4. To identify the organizational training capabilities, current implementations, plans, and attitudes that pertain to WBT.
5. To identify the advantages and disadvantages of WBT that concern companies located in HSIP.

### **Limitations of the Study**

The primary limitations of this study are:

1. The companies selected for participating in the survey of this study are all located in HSIP, Taiwan. The results of this study will only present the condition of Taiwan's high-tech industry because companies in this area all belong to the high-tech industry
2. The questionnaire will be translated from English to Chinese and the comments from participants will be translated from Chinese to English. Therefore, the information may be missed partially in the translation process. The English version questionnaire will be attached with the Chinese one, upon which participants can refer to the English version if they want to.
3. The participants of this survey are limited to directors or managers of Human Resource or Training and Development departments. Therefore, the opinions and perceptions will be from the management level.

### **Assumptions**

Because the subject of this survey is the high-tech industry, the researcher assumes:

1. That over 80% of these companies have access to the Internet.
2. All companies have the consensus that training is needed for them to succeed and they are willing to make an effort on improving training.
3. At least 50 percent of these companies are interested in WBT and plan to implement WBT in the near future.

### **Definitions**

The following definitions and terms are used in this study:

Access – “To retrieve data or program instructions from a disk drive or another computer connected to your computer by a network or a modem (Nader, 1998).

American Standard Code for Information Interchange (ASCII) – “a code that changes letter, numbers, and symbols into a 7-bit code, with an eighth bit acting as a check bit (Nader, 1998).

ARPANET – “Advanced Research Projects Agency Network; a wide area packet-switching network developed by the United States Department of Defense to link facilities in government agencies and universities (Nader, 1998).

Bulletin Board – “A communications utility providing a group of users access to certain current information, just as notice boards are hung in organization and institutions to provide a central point for communications”. “This utility allows each employee to decide if the information is of interest, and to access the information as needed” (Nader, 1998).

CAI - Computer-assisted Instruction

CAL – Computer-assisted Learning

CBE – Computer-based Education

CBT - Computer-based Training

CERN – “Counseil European pour la Recherche Nucleaire, a French name for the European Laboratory for Particle Physics”. “The original protocols for the World Wide Web (WWW) were written by Tim Berners-Lee and other researchers in Geneva, Switzerland, at the CERN (Nader, 1998).

CI – Classroom Instruction

EPSS – Electronic Performance Support Systems

FTP – File Transfer Protocol. “A type of asynchronous communications standard that is used to transmit data across telephone lines”. “For the Internet, FTP is the oldest form of file access. It requires that the accessed file first be downloaded onto the user’s computer before that user can read and/or manipulate that file.

Graphic User Interface (GUI) – “A collection of graphical icons, menus, clipboards, desk accessories, and alert boxes, each accessible through the use of a mouse” (Nader, 1998).

Groupware – “A general term for software applications that are designed to streamline the collection and dissemination of information. Users operating under a groupware environment can build on the information that their co-workers generate” (Nader, 1998).

HSIP - Hsinchu Science-based Industrial Park

HTML – Hypertext Markup Language. “The universal codes used for the World Wide Web to instruct a Web browser how a document is to be managed and displayed, and in particular, where the hypertext links will take the user” (Nader, 1998).

HTTP – Hypertext Transport Protocols. “On the World Wide Web, the file transfer protocol (method) that enables that user to send and retrieve files across the Internet. HTTP allows the author of a Web page to embed hyperlinks to other Web sites. When a user clicks on any of the special words which contain a hyperlink, then the Web browser automatically goes to that link, enabling the user to traverse the Internet without necessarily knowing where and when different file servers are being accessed” (Nader, 1998).

IBT – Internet-based Training

Internet – “The World’s largest interconnected computer environment. It consists of millions of computers and tens of millions of users” (Nader, 19998). “A system of linked computer networks, worldwide in scope, that facilitates data communication services such as remote login, filetransfer, electronic mail, and distributed newsgroup” (Pfaffenberger, 1993).

IRC – Internet Relay Chat. “On the Internet, a real-time forum where users can connect and chat with each other through the keyboard. What one person types on the keyboard can be seen by all the parties on the chat room.

ISO – International Organization for Standardization. “a worldwide federation of national standards bodies whose objective is to promote the development of standardization and related activities in over 90 countries, with a view to facilitating international exchange of goods and services.

Local Area Network (LAN) – "the linkage of personal and other computers within a limited area by high-performance cables so that users can exchange information, share extensive peripherals, and draw on the resources of a massive secondary storage unit, called a file server" (Pfaffenberger, 1993).

Random Systematic Selection – “a sample selected from a finite population is said to be random if every possible sample has equal probability of selection. This applies to sampling without replacement; a random sample with replacement is such that each

item is independently selected with equal probability (and so each possible ordered sample is chosen with equal probability).”

Standard Deviation – “The most widely used measure of dispersion of a frequency distribution introduced by K. Pearson (1883). It is equal to the positive square root of the variance. The standard deviation should not be confused with the root mean square deviation.”

TCP/IP – Transmission Control Protocol/Internet Protocol. “A suite of protocols (standards) that controls the transport layer and network layer of a wide area network or networks that operate under Internet technologies (collectively called I-Nets)”. “TCP/IP is used as the common language for data transmission and error correction” (Nader, 1998).

URL – Uniform Resource Locator. “In the World Wide Web, the unique address of the Web site on the Internet. It allows the Web browser to identify which file in which directory needs to be retrieved for the user. The URL must work in conjunction with the Internet Protocol (IP), which is used as a prefix to the URL and gives the unique address of the host computer where the Web pages are stored (Nader, 1998).

Videoconferencing – “A real-time, two-way transmission of digitized video images between two or more locations for the purpose of conducting meetings between two

or more remote locations, thereby avoiding lengthy and expensive travel” (Nader, 1998).

#### WBI – Web-based Instruction

Web-based Training (WBT) - WBT is to describe text-based lessons via email, training materials or files copied across the Internet, multimedia online books viewed with a browser, and live instructor-led video and audio exchanges delivered via the Internet.

Wide Area Network (WAN) – “A system that uses high -speed, long-distance communications networks or satellites to connect computers over distances.” (Pfaffenberger, 1993).

World Wide Web (WWW) – “A system that allows distributed documents across the Internet to be accessed easily using client / server architecture. This is done through the use of hypertext – a form of non-sequential text-retrieval which interconnects a series of documents so that retrieval and immediate cross-referencing is possible” (Nader, 1998).

## **CHAPTER TWO**

### **LITERATURE REVIEW**

This chapter reviews the literatures related to the use of Web-based training (WBT). In addition, this chapter also reviews the history and use of the Internet and Computer-based training, which helped develop WBT to meet the training need of the networking Age. The main issues that will be discussed in this chapter are as follows:

- Brief introduction of Taiwan and Hsinchu Science-based Industrial Park (HSIP).
- History of the Internet
- Computer-based training
- Web-based training

#### **Introduction of Taiwan and HSIP**

This research study was to examine Taiwanese companies on their training capabilities, current implementations, plans, and attitudes that pertain to WBT by surveying companies located in the Hsinchu Science-based Industrial Park. Therefore, prior to the related literature review, some background of Taiwan and the Hsinchu Science-based Industrial Park(HSIP) will be explained as well.

## **Taiwan**

Taiwan is an economic power in the Asia-Pacific Region, the world's 15<sup>th</sup> largest trading country, with the 3rd highest foreign exchange reserve. It is bustling and vibrant with 22 million educated and energetic residents.

The Taiwan Government has pursued an aggressive program of industrialization, with technology-intensive industries, such as computer hardware and telecommunications being the fastest growing. In 1997, the computer hardware industry reached US\$ 30 billion in production to become the 3rd largest in the world. The production of the telecommunications industry of 1996 reached US\$ 3.2 billion, growing 27% from the previous year. The international financial community continues to recognize Taiwan's economic strength and potential to grow through their investments in large-scale projects. Taiwan's economic achievements have resulted in an average increase of 6.4% per capita income over the past 10 years (Global Views Monthly, 1999).

### **Hsinchu Science-Based Industrial Park**

The Hsinchu Science-based Industrial Park (HSIP) was established with the aim of creating a center for the development of high-tech industries in Taiwan, providing a high quality environment for both working and living. After about 20 years of hard work, the HSIP has become a model of success for science parks. During the past two

decades, the Taiwan government invested more than US\$620.5 million in software and hardware facilities for the park, providing the high-tech industries with a centralized space for development. By the end of 1998, the HSIP had a total of 272 companies with the combined annual sales revenue of about US\$13.7 billion.

The HSIP is divided into an industrial area, a residential area and a recreational area. Currently, it covers an area of about 580 hectares. Another 25 hectares of land are still under development. The industrial area contains standard factory buildings, custom designed factory buildings and laboratories.

The number of high-tech companies in the HSIP grew to 272 in 1998. Among the companies in the park, 222 were domestically owned and 50 were foreign-owned. HSIP companies are classified into six categories: Integrated circuits, Computers and Peripherals, Telecommunication, Optoelectronics, Precision Machinery and Materials and Biotechnology. The activities of these companies are more and more geared to internationalization. To place products on foreign markets, the companies have to comply with the International Organization for Standardization like the ISO 9000. More than 40 companies of the HSIP have complied with ISO9000. 47 companies have set offices abroad, and many well known foreign manufacturers have already signed science and technology cooperation agreements with the park companies.

Table 1 gives detailed information on HSIP, including numbers of companies, employees, sales, and growth rates.

Table 1:

The report of 1998 HSIP Industries  
 (\*US\$M)

Industry	Firms	Employees	Sales *	Growth (%)
Integrated Circuits	112	41,253	6,932	-0.6
Computer and Peripherals	47	16,623	4,802	-3.3
Telecommunications	44	5,170	794	-12.1
Optoelectronics	39	7,657	894	-8.1
Precision Machinery and Materials	15	1,554	225	89.0
Biotechnology	15	336	17	21.1
Total	272	72,623	13,664	-2.1

By the end of 1998, about 72,623 people were working in the HSIP. The proportion of employees with at least a junior or technical college education was 61%. The average age of workers in the Science Park was 31; men made up 49% of the work force and women 51%. Returning expatriates have played an important role in the development of the Park.

Members of this group founded 109 companies in the HSIP. The technical and scientific skills and ideas of the over 3000 returned expatriates working in the park are being applied and further developed.

In order to help the companies to enhance the quality of the personnel and to shorten the training time of new employees, the Science Park Administration arranges training courses offered by industries and schools, in addition to the vocational

training held inside companies. The teachers and the teaching materials mainly come from National Tsing Hua University, National Chiao Tung University, the Industrial Technology Research Institute and companies of the HSIP. The educational program includes management classes, seminars on special topics such as Intellectual Rights, Accounting and Technology, training courses for jobs in the six major industries, and evening classes after working hours. Each year, up to 5,000 employees take part in this educational program.

With Taiwan using the HSIP as an experimentation area for its National Information Infrastructure (NII) development program, the HSIP now has various network services (Figure 1), such as automated customs clearance, electronic document transfer, water resources management, visual conferences, distance study, and World Wide Web access. In 1998, the visual information cable network was completed. At present, experiments with XDSL Network and the combination of visual information network and e-mail network are under way. With an information network system that meets international standards, the HSIP companies are expected to be more successful in international management, technology research, and the use of network services (The Association of Allied Industrial in HSIP).

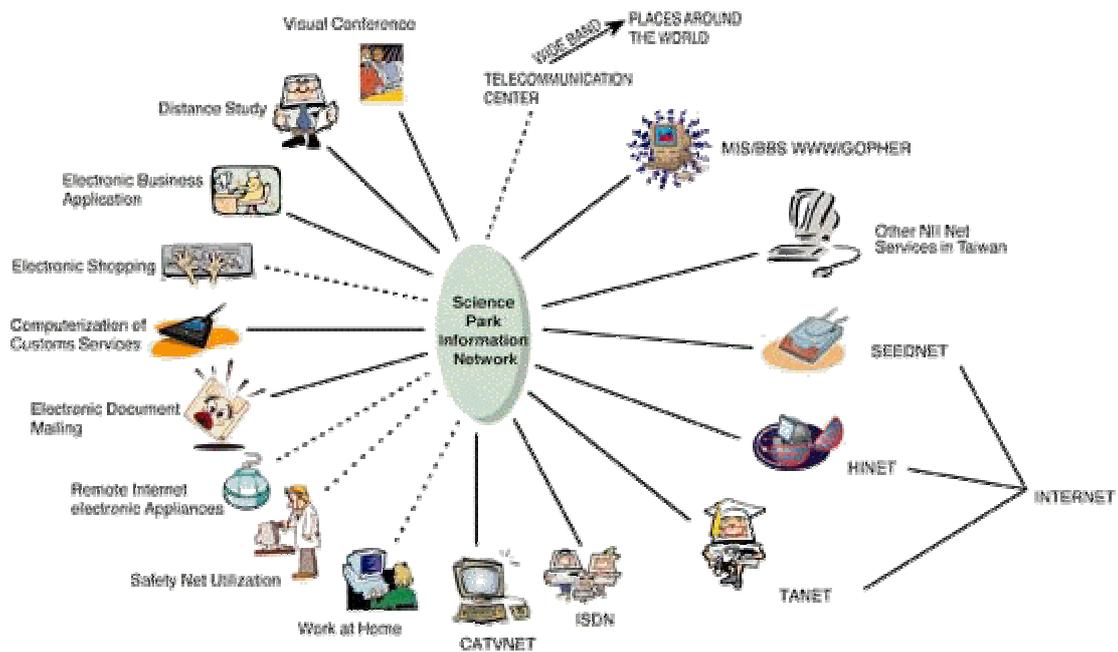


Figure 1. HSIP Network Services

Notes. From The Association of Allied Industrial in HSIP (2000)

### History of the Internet

The Internet is a vast, sprawling network that reaches into computer sites worldwide (Gilster, 1994). The development of the Internet is a revolution in communication that is providing a new way of information gathering and sharing, and instruction delivery.

The Internet is similar to its early predecessor, the telegraph, in three ways. First, the Internet provides digital communication service that allows one to transfer a set of numbers from one computer to another. Second, The Internet encodes all data using zero and one, the two binary digits. Third, the Internet hides the details of data encoding from the user (Comer, 1997).

By the late 1970s, computer networking began to blossom. Some computer manufacturers introduced small minicomputers with sufficient computational power to handle many users. To interconnect minicomputers and to permit the rapid transfer of information among them, a lot of organizations began installing LAN (Local Area Networks), which allows each group within an organization to build and operate a computer network. In addition to LAN technologies, WANs (Wide Area Networks) emerged in the 1960s and 1970s, which connect multiple LANs together (Comer, 1997). However, computers attached to a LAN and those attached to a WAN are not compatible, so that a single network is desired.

By the late 1960s, the U.S. Department of Defense became interested in using computer networks. Through the Advanced Research Projects Agency (ARPA), the military funded research on networking using various technologies. By the late 1970s, ARPA had several operational computer networks and had begun to pass technology on to the military. ARPA projects included a wide area network called the ARPANET as well as networks that used satellites and radio transmission for communication. The main idea in the ARPA research was a new approach to interconnecting LANs and WANs that became known as an internetwork (Comer, 1997). The primary goal of the ARPANET was to experiment with ways to link university research centers and high-tech defense contractors together. The reason why the ARPANET was able to

grow into the Internet was its capability to interconnect networks even if they use different local networking protocols (Fenton, 1997).

The common language that allowed the networks to interconnect is TCP/IP, which stands for Transmission Control Protocol/ Internet Protocol. TCP/IP owes its structure to the Internet's heritage as a Defense Department project. The protocol was devised to ensure that messages of any length could be sent from one computer to another even if parts of the network were inoperative (Fenton, 1997).

To make up the Internet, there are three basic parts as demonstrated in Figure 2 (Nielsen, 1998). The objects on the most basic level are to make up the physical connection from one location to another. In the network level, TCP/IP is to ensure transmission of the right data to the right location in the right order. Because of this protocol, all nodes on the Internet are equal and have their own authorities to initiate, deliver and obtain messages. At the last level, the human interface to the Internet is through applications that allow users to access data. Initially, the applications (FTP, Mail, Usenet, Telnet) developed for the Internet were not user friendly (Nielsen, 1998).

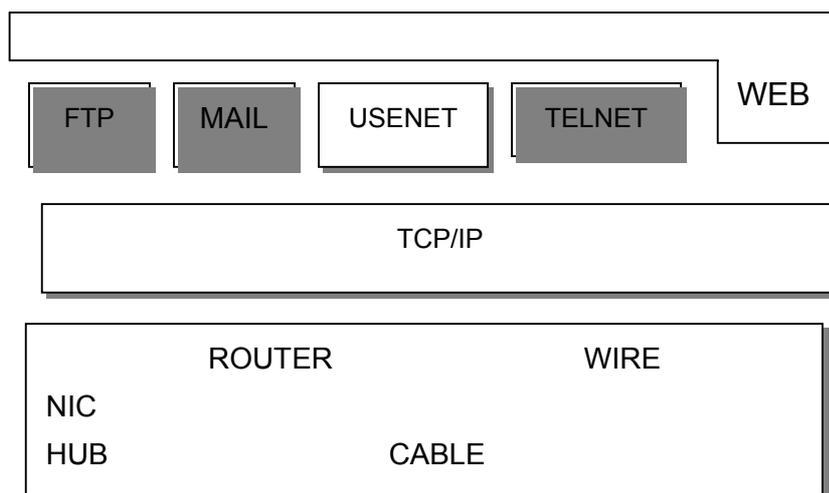


Figure 2. Parts of the Internet

By the mid-1982s, the National Science Foundation (NSF) recognized how important the Internet was becoming to science. In 1985, NSF intended to connect researchers at 100 universities to the Internet. It consulted experts in the field and began a program that resulted in major changes to the Internet. NSF took the first step by establishing a Wide Area Network that interconnected computers at its five supercomputer centers. The network used TCP/IP, and provided a connection to the Internet. The network, named NSFNET, was much smaller and not any faster, than the ARPANET; therefore, scientists found the network useful, but not exciting. By the end of 1991, the Internet was growing so fast that the NSFNET would soon reach its capacity. Three private organizations, IBM, MERIT, and MCI, formed a nonprofit company called Advanced Networks and Services (ANS) to solve this problem. During 1992, ANS built a new Wide Area Network to serve as the Internet backbone. Acknowledged as ANSNET, the WAN utilized transmission lines with 30 times the

capacity of the NSFNET backbone it replaced. In 1995, MCI Corporation developed a WAN to replace ANSNET. The new WAN, Backbone Network System (vBNS), transferred ownership to a private company and drove the Internet toward commercialization and privatization (Comer, 1997).

The Web began at the European Laboratory for Particle Physics (CERN) in Geneva, Switzerland in March 1989 (Nielson, 1998). Scientists were looking for ways of sharing resources in formats other than plain text. These physicists needed to transfer graphical images, video chips, audio files, and texts more complicated than the 128 characters of the simple ASCII font standard could support. Many documents required complex mathematical tables and formulas, international font sets, and most importantly, quick links to other online documentation or resources. It was out of these needs so that the hypertext transport protocols (HTTP), Uniform resource Locators (URLs), and Hypertext Mark-up Language (HTML) were developed (Nielson, 1998).

The Internet was born long before Web technology, but the invention of the Web made the Internet more popular ever before. Because of the graphic capabilities and ease of use, web technologies became popular right after the Internet was opened for commercial sites in 1990. Two years later, at the University of Illinois, Marc Andreessen and a team from the university's National Center for Supercomputing

Applications in Champaign, IL developed Mosaic, the first web browser. Mosaic and the various browsers that followed supported a graphical user interface (GUI) and provided an environment where users could access information easily. The capability to include sound, video, and images, coupled with the wild growth of personal computers, drove the World Wide Web and the Internet itself into public view (Nielson, 1998).

### **Computer-Based Training**

Instructional computer programs are identified by a variety of names as follows: computer-assisted instruction (CAI), computer-based education (CBE), computer-assisted learning (CAL), computer-based instruction (CBI), and computer-based training (CBT).

Computer-based training is composed of a wide range of techniques, procedures, and applications. Instructional material is usually presented to students on the screen of a terminal or personal computer. The students can respond to the questions by entering answers through the keyboard or mouse (Larsen, 1985). The effective capabilities such as the ease of standardizing individual learning differences, large information storage capacities, and reduced training cost, enhance the attractiveness of CBT implementation (Kamouri, 1983).

## **History of the Use of Computers in Education**

Computers were first used by educational institutions at the end of the 1950s for administrative purpose (Alessi & Trollip, 1985). In the 1970s, Alkinson introduced computer-based adaptive instructional systems to optimize instruction through mathematical models that decreased the probability of student error (McFarland & Parker, 1990). At the same time, TICCIT (Time-shared Interactive Computer Controlled Instructional Television) system was developed by MITRE Corporation and Brigham Young University. This system provided courses to students by presenting data on standard color televisions and interaction through modified typewriter keyboards (Merril, Schneider, & Fletcher, 1980). During the same period, PLATO IV was introduced. With this system, students studied on individual terminals, hundreds of which were connected to a large computer on which all lessons and student data were stored (Alessi & Trollip, 1985). In the 1970s, the Minnesota Educational Computer consortium (MECC) tried to install computers and related facilities in the public schools, but none of these early microcomputers were successful. In 1977, three different microcomputers were introduced by Radio Shack, Commodore Business Machines and Apple Computer, and finally proved to be successful. From 1997, computers have been used in instruction at an extraordinary

rate. All colleges, universities, and most elementary and secondary schools have microcomputers (Alessi & Trollip, 1985).

### **Computer-Based Training Features**

Everyone appears to be searching for the latest high-tech gadget to solve his or her training problems. The decision to implement a high-tech solution relies on the same basic rules as the implementation of any training program. Companies must assess their needs as an organization, decide their desired outcomes, and create a means in which to measure the outcomes (Wilson, 2000).

By the use of computer-based training (CBT), the computer becomes the trainer, using a mix of full-motion video, animation, graphics, text and audio. The idea that CBT is an effective training mode is founded on its interactivity with the trainee. As trainees direct their progress through the material and actively participate by responding to prompts and questions, they pay more attention to the subject matter. In the end, this results in better knowledge gains and superior retention levels in a shorter period of time (Lawson, 1999).

Generally, most CBT programs feature several key elements (Lawson, 1999).

1. Testing - Basically, there are two types of tests of CBT training programs.

Pre-tests are used to evaluate a trainee's existing knowledge. Afterward,

the program credits the person for proficiency in certain areas and focuses training on deficient areas. This approach can significantly lessen the period of training. Post-tests are used to assess the trainee's understanding after going through the training. They may need to answer some self-check questions that help clarify whether the trainee comprehends basic concepts involved.

2. Training Suites - In the traditional training setting, all employees may need to attend training programs that they may not need for perform their jobs. This feature of CBT can be easily tailored to meet the needs of different departments or individuals.
3. Bookmarks - In the sessions of classroom or on-the-job training, interruptions occur inevitably so employees may miss some key information. Within a CBT program, a bookmark reveals where the trainee stopped, and then brings her/him back to that point without repeating previously covered material.
4. Database - It is easier to manage courses and track employee progress by using the database feature. With the report of the database, training times and test scores can be assessed. Additionally, the database tracks dates of

training and demonstrates when retraining should occur, which is often ignored by organizations due to tracking or scheduling problems.

5. Customization - Through customization features, a company can modify a program to match its own policies and procedures. Any technologies such as full-motion video, animation, graphics, text and audio can added to deliver information relevant to the firm's objectives.

### **Advantages and Disadvantages of Computer-Based Training**

The use of CBT is to help companies overcome the weaknesses of traditional training. In general, there are four primary advantages of CBT. First, an employee can review specific topics on which she/he needs clarification within a self-paced instructional program (Hequet, 1997; Rand, 1996). Second, according to the result of a research which compared CBT with Classroom Instruction (CI), CBT can reduce 34 percent of training time (Maul & Spotts, 1993). Third, since CBT can decrease training time, it would also save on training cost (Lawson, 1999). At last, based on a pre- and post-test evaluation of both CBT group and CI group, CBT students scored an average of 1.53 percent higher on the post-test than did CI participants (Perry, 1994).

While CBT is considered as a remarkable training method, the lack of peer or human interaction is its main disadvantage. In the CBT setting, people have less opportunity to communicate and address their concerns; new employees may not obtain the friendly introduction afforded by human interaction. In addition, if the CBT developers don't understand the objectives of the training distinctly, the quality of the training may not be efficient or effective (Lawson, 1999).

### **Web-Based Training**

It is identified as Web-based training (WBT), Web-based instruction (WBI), or Internet-based training (IBT) where instructional programs are delivered via World Wide Web, or uses graphical browsers are used to navigate the contents of the programs (Driscoll, 1997).

More specifically, Web-based training is defined as describing text-based lessons via e-mail, training materials or files copied across the Internet, multimedia online books viewed with a browser, and live instructor-led video and audio exchanges delivered via the Internet. Web-based training is a colossal term and made complex by the range of technologies involved (Driscoll & Reid, 1999). Internet technology has generated a perfect environment which favors the delivery of Web-based courses from distant, worldwide sites. There is a very real need to present a technology-infused means of training technical communicators, and Web-based training is one way to achieve that task. Developing the Web-based training Internet/intranet infrastructure

provides a timely, cost effective and correct solution, offering substitute or supplementary ways of learning for technical practitioners (Driscoll & Reid, 1999).

It has been suggested that increased use of performance support systems, sophisticated computer simulations and multimedia training programs are changing and diminishing the role of the traditional corporate classroom (Wulf, 1996). In 1996, Wulf also demonstrated that when corporations were certainly leading the high-tech revolution in the delivery of education via simulations and multimedia, the use of the Internet for training was just beginning to be realized. However, a growing number of organizations and universities have been using online delivery as a less expensive and more convenient alternative to the classroom. In addition to the Internet, the growing use of internal corporate “intranets” (in house versions of the World Wide Web accessible only to employees) provides corporate trainers with new possibilities for internal training delivery (Wulf, 1996).

### **Web-Based Training Forms and Methods**

Driscoll (1999) has identified four kinds of Web-based training characterized by goals, instructional strategies, and roles of the instructor and students.

1. Web/Computer- Based training - This type of training is the most common Web-based training. It is similar to traditional computer-based training delivered via CD-ROM. Organizations can use this type of training to teach individual

learners skills that have apparent right and wrong answers. The advantage of it is that it is capable to link the instructor and the students perfectly and to update materials without increasing costs.

2. Web/Electronic Performance Support Systems (W/EPSS) - This type of training provides online job aids that help employees do their jobs by offering tools such as hypertext documents, Java-based calculators, forums, databases, and other tools to provide information and to assist employees resolve problems. W/EPSS systems are similar to traditional electronic performance support systems, but they are not enclosed on the desktop. W/EPSS tools are vibrant and easily updated as the performance support information resides on a centralized computer or server.
3. Web/Virtual Asynchronous Classrooms - In the computer-mediated environment, virtual classrooms are the focus. This type of training allows the learner instructional access at any time from anywhere in the world, and students can come and go as often as they wish. The greatest advantage of Web/virtual asynchronous classroom programs is that students and the instructor can engage in collaborative learning activities without being online at the same time. These programs rely deeply on communication tools such as email, online forums, bulletin boards, listservs, and other asynchronous communication tools. Because

they are designed to enhance abilities of analysis, synthesis, and evaluation, there are no simple yes or no answers.

4. Web/Virtual Synchronous Classrooms - This type of training is most similar to the traditional, physical, instructor –led classroom training. It brings students and the instructor together online at the same time to participate in live discussions, brainstorming, debates, role playing, software demonstrations, and panel discussions. It applies various synchronous tools such as Internet relay chat (IRC), application sharing, whiteboards, audioconferencing and videoconferencing on the Web to engage learners.

Furthermore, there are five primary training delivery methods that can be used individually or in any combination with other instructional methods (Wulf, 1996).

1. E-mail - Students obtain class content and communicate with the class group, instructor, and individual students by e-mail. A listserv discussion group may be set up by the instructor, so comments or questions can be sent to the listserv e-mail address and be restructured routinely to the group.
2. Bulletin boards - Students communicate by posting comments and questions straight on to an electronic bulletin board, forum, or newsgroup. This method provides a more organized kind of electronic conversation than a listserv, because users can decide the specific topics they want to read and respond to.

3. Downloading - Students retrieve documents, tutorials, or software by downloading items from a bulletin board, by using FTP (File Transfer Protocol), or by using the download option available on the World Wide Web. This is the least interactive method but may be the most commonly available type of training on the Internet. The difference between this and the e-mail method is that materials are not automatically sent to students but they have to actively go to the Internet site and download materials.
4. Interactive tutorial - Students go to an Internet site and take a tutorial online. The tutorial may include readings, linkages to new WWW sites, question answering, and evaluations. Some tutorials are designed as self-paced programs that allow students to take courses anytime and anywhere with their password.
5. Real-time conferencing - Real-time communication is synchronous communication, while bulletin boards and e-mail are referred to as asynchronous communication. This method is the closest the Internet comes to imitating a classroom. It can be assisted within a MOO (multi-user Object Oriented) environment, an interactive system accessible by many users at the same time. MOOS are based on the MUD (MultiUser Dungeon) concept, in which participants assume roles and can interact with a virtual environment.

### **Advantages of Web-Based Training**

Among the advantages of using the Internet are the following (Glener 1996; Wulf 1996):

1. Time and place-independent – Learners can choose to log on whenever and wherever they want to, which saves on travel costs and being away from the office. It also reduces costs of printing and mailing manuals and CD-ROMs. In addition, a collaborative learning environment and instruction with new groups of people can be made available through WBT setting.
2. Multi-platform capability - No matter what platform employees are using, they can access WBT by using web browsers.
3. Easy updating of content - Compared with updating a CD-ROM training product, it is easy and quick to update the content of a Web page. In addition, it is faster to modify and distribute curriculum than CBT or any traditional training.
4. Quick development time - Compared with CBT, a completed WBT product can be developed more quickly.
5. Variety of capabilities - Based on training needs, organizations can use any multimedia and methods to assist training.

6. Learner control - Learners have more control of the pace of the course. Furthermore, they can come back online at any time for more help and clarification.
7. Opportunity for interaction - In the Internet learning environment, learners are unaffected by gender, race, and age differences. Additionally, for asynchronous conferencing, students have more time to think before posting their comments to the class.

### **Disadvantages of Web-Based Training**

The following are some disadvantages of Web-based training identified (Wolf, (1996; & Hall, 1997):

1. Bandwidth limitations - These limitations would cause slower performance of WBT and the delivery speed, especially when the training program incorporates sound, video, and graphics.
2. Lack of Internet skills - If employees don't have the computer skills or Internet knowledge to use this method of training, companies have to train them before conducting WBT.
3. Inappropriate delivery method for some courses - Activities, involved with emotional issues such as team building or with operational issues, may not be delivered via WBT.

### **Organizational Readiness**

It is critical to consider the organization's culture and technology while preparing to launch WBT. Organizational readiness is the key for WBT to be successful. If the organization and its culture are not supportive, it is difficult for WBT to be successful even if employees are ready for it (Colbrunn & Van Tiem, 2000). Therefore, organizational culture somehow needs to be changed to adapt new ideas and technologies.

In addition to the organizational culture, technical readiness is another challenge. Organizations have to provide the sufficient and compatible equipment for the high quality of course delivery. Moreover, they have to ensure that ample technical staff is available to support the needs of the originating server and the learner's location (Colbrunn & Van Tiem, 2000). Because WBT is an innovative method and technology-based, it requires a supportive environment and equipment more than the traditional training methods.

### **Related Studies**

It is becoming increasingly popular to deliver instruction and training material via the World Wide Web. The advantages of WBT drive both educational and commercial organizations to make the initial investment. There are a number of research studies that have identified the effectiveness and efficiency of Web-based

training and Web-based Instruction (WBI). For example, Suteera Chamlongsupalak (1997) designed a research study to evaluate a Web-based instruction that was to teach library literacy skills to undergraduate students of University of Wisconsin-Stout. It compared Web-based instruction and traditional classroom presentation for teaching literacy skills by pre- and post-testing students. The results of this study indicated that Web-based instruction could be as effective as a traditional classroom presentation.

In addition, in 1998, Suwathana Bhuripanyo developed a research study to evaluate a Task Analysis course (199-534) that was offered by Dr. Schlough, a department chair at University of Wisconsin-Stout. This course was taught in the form of a Web-based instruction via the Internet for undergraduate students employed at the Milwaukee Area Technical College and students of the University of Wisconsin-Stout. The research study was designed to identify if a Web-based instruction program can be effectively used to deliver the content of the Task Analysis course (199-534), to discuss the role of Web-based instruction used as an instructional tool, and to make recommendations regarding the use of Web-based instruction in the Task Analysis course. Although most of the participants of this study addressed that they prefer to the conventional classroom setting, they also identified some positive characteristics and benefits of the Web-based instruction. Bhuripanyo mentioned that

conducting a pilot test and adjusting the course content would improve the Web-based instruction.

### **Summary**

This chapter, first of all, introduced the background of Taiwan and HSIP, which provided a big picture of the survey population of this research study. Second, it reviewed some literature related to the history of the Internet, Computer-based training and web-based training. The information obtained from the literature review supports the necessary knowledge for understanding the WBT development and for designing and conducting the survey. The research methodology, design and procedure will be demonstrated in Chapter 3.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **Introduction**

This study examined companies in Taiwan on their training capabilities, current implementations, plans, and attitudes that pertain to WBT. The researcher particularly selected the companies located in HSIP as the survey population of this study because high-tech industries always play the role of pioneer to other Taiwanese industries and Hsinchu Science-based Industrial Park (HSIP) has the majority of high-tech companies. This study identified the methods that are currently most commonly used for training in Taiwan and the trends of the use of WBT. This study also discovered the advantages and disadvantages of WBT that concern those companies.

#### **Research Design**

The researcher, for the purpose of this study, developed the research design. The literature review provided the knowledge needed to design this descriptive study founded on the combination of qualitative and quantitative data. The information and recommendations from the researcher's advisor, Dr. Schlough, also helped develop this study more completely.

The main instrument used for collecting data was a mail survey that addressed the research questions of the study (See Appendix B). The survey questions were

influenced by the research collected from the literature review. The basic format of the survey was adapted from “Web-Based Training Information Center 1996 Training Survey” (WBT Information Center), which was conducted from September 1996 to June 1997. The results of this training survey illustrated participant interest in Web-based training and Web-based performance support systems for workplace training and organizational interest in the financial, cultural, and technical structures necessary to implement such systems. Because the population and research objectives are somewhat different from the survey conducted by WBT Information Center, the researcher only adapted part of its format and used the other information gathered from the literature review. Additionally, because the population is Taiwanese, the researcher translated the questions into Chinese for convenience and better understanding for the population.

There are 18 questions in the questionnaire. Based on the objectives and purpose of this research, questions can be divided into five sections. The first section of the survey, relating to research questions number one, six and seven, asked the respondents to identify a) if the organization has a formal training and development program for the employees, b) which type of training the organization offers, and c) how the organization develops its training program. This section identified their attitude toward training. The second section of the survey, relating to research

questions number four, five, eight, 11 and 14, asked the respondents to identify a) if the organization is using WBT currently or plans to use WBT in the next 12 months, b) which training methods the organization is using or plans to use, c) which modes of WBT the organization is using or plans to use, and d) if the respondent has any comments about WBT. This section determined their current implementations, plans, and attitudes of training to WBT as well. The third section of the survey, relating to research questions number two, three, nine, and 10, asked the respondents to identify a) if the organization has access to the Internet, b) if the organization has its own intranet or plans to establish one soon, c) what kind of hardware the basic computers are equipped for, and d) what access the employees have with the computers provided by the organization. As Colbrunn & Van Tien addressed that technical readiness was one of the challenges for WBT, this section was designed to find out the capabilities of organizations to adapt WBT. The fourth section of the survey, relating to research questions number 12 and 13, asked the respondents to identify advantages and disadvantages of WBT, which they might consider while conducting WBT. It is necessary to deliberate benefits, possible costs and the impact of training methods before using WBT. Therefore, this section also determined the attitudes of the respondents toward WBT. The last section of the survey contains demographic items, including the job title of the respondent, the type of business and the number of

employees of the organization the respondent represents. This section provided the opportunity to determine who would be more interested in WBT and if the size of organizations had an impact on using WBT.

### **Population Selection**

This study was designed to examine companies located in the HSIP on their training capabilities, current implementations, plans, and attitudes that pertain to WBT. The HSIP was selected because it is comprised of high-tech organizations. By surveying those companies, the data would present the most accurate trends of WBT because high-tech industries play the role of pioneer to other Taiwanese organizations. There are 272 organizations in this area (The Association of Allied Industrial in HSIP). According to the chart from “Figuring Things Out: A trainer’s guide to need and task analysis” (Zemke, R. & Kramlinger, T, 1982), 162 organizations were selected to send the questionnaires. It was a big population size so that the data collected from it would be more objective and accurate.

The names, addresses and phone numbers of the population were acquired from The Association of Allied Industrial in HSIP. The list of all organizations was ordered by the dates they registered. The random systematic selection process, counting every other one from the first name on the list, selected the organizations that received the questionnaires. When the name was selected, it was taken away from the list. The

procedure ended when the researcher obtained 162 names. Finally, each respondent was assigned an identification number to use for follow up purposes: maintaining a record of all name and address corrections, monitoring the response rate, and tracking survey activities.

### **Instrument Development**

Because of the research questions and size of the population, a mail survey appeared to be the most economical and appropriate method of data collection. In addition to the low-cost consideration, mail surveys give people flexibility and more time to answer questions.

The instrument was developed through a prudent examination of similar studies found in the literature review. People who worked in the training or human resources field were chosen to be the participants of this survey. It could not be expected that all participants read English, so it was necessary to translate the questionnaire from English into Chinese. In order to avoid making respondents confused or misunderstand the questions, the researcher conducted the pilot test by emailing the questionnaire to five people, asking them to go through it and give the researcher feedback to adjust the questionnaire. All of them were Taiwanese: two graduate students of University of Wisconsin-Stout, a Human Resource Specialist of Taiwan High Speed Rail Corporation, an administrator of Holtek Microelectronics

Corporation, and a human resources manager who worked in HSIP. Their opinions and suggestions, which were based on the experience of survey designs or related working experience, helped modify the questionnaire to be more effective and easily understood.

The research survey was designed to identify the organization's training capabilities, current implementations, plans, and attitudes that pertain to WBT. The target population of this study was HR specialists, HR managers, or the decision-maker of a company. Their responses would provide the information highly related with the actual implementations and future plans.

### **Data Collection**

To inform all participants about this research study, the cover letters (Appendix A) were sent along with the questionnaires on July 1, 2000. Each participant was asked to fill out the questionnaire and return it with an enclosed envelope by July 14, 2000. To reach the 50% response rate, the follow-up letters and the questionnaires were mailed to the participants who did not complete and return the questionnaires within the first mailing timeline. The second timeline allowed participants to respond by August 1, 2000. The researcher analyzed the collected data in the period of August 1 to August 8 and sent the survey results to those who had asked for the result report.

### **Summary**

This chapter described the research design, questionnaire development, population selection, instrument development processes, and data collection procedures. The knowledge for designing and developing this research was acquired from the literature review and from the expertise of the research's advisor. The results will be analyzed in chapter 4 with the research findings.

## **CHAPTER FOUR**

### **ANALYSIS of RESULTS**

The purpose of this study was to examine companies located in HSIP, Taiwan, on their training capabilities, current implementations, plans, and attitudes that pertain to WBT. Furthermore, the results of this study would help Taiwanese organizations understand the trend of WBT in Taiwan, and what kinds of technology and attitude were supportive for WBT. As discussed in chapter three, a questionnaire was designed as a research instrument for data collection. Data and information found in this study were analyzed and discussed in accordance with the research objectives demonstrated in chapter one.

The Statistic Package of the Social Sciences (SPSS) was utilized to analyze the data obtained in this study. According to the data received from The Association of Allied Industrial in HSIP, there were 272 companies located in HSIP, which were the population of this study. According to the chart from “Figuring Things Out: A trainer’s guide to need and task analysis” (Zemke, R. & Kramlinger, T, 1982), 162 organizations were selected randomly to receive the research questionnaire and there were 99 responses in the period from July 1 to August 1. However, eight of these responses were not filled out completely so that they were unable to be counted as

valid responses. Accordingly, the analysis of the survey depended on 91 complete questionnaires of a sample response rate of 56 percent.

The questionnaire included 18 questions. Based on the objectives and purpose of this study, these questions were divided into five sections. The first section of the survey, relating to research questions number one, six and seven, was to identify their attitude toward training. The second section of the survey, relating to research questions number four, five, eight, 11 and 14, was to determine their current implementations, plans, attitudes to training and WBT as well. The third section of the survey, relating to research questions number two, three, nine, and 10, was to find out the capabilities of organizations to adapt WBT. The fourth section of the survey, relating to research questions number 12 and 13, was to identify advantages and disadvantages of WBT that might be of concern while conducting WBT. It is necessary to deliberate the benefits, possible costs and the impact of training methods before using them. Therefore, this section was also to determine the attitudes of the respondents toward WBT. The last section of the survey contained demographic items, including the job title of the respondent, the business type and the number of employees of the organization. This section provided the opportunity to determine who would be more interested in WBT and if the size of organizations had an impact on using WBT.

## Section 1

### Question 1

Does your organization have a formal training and development program for your employees?

71.4 percent of respondents indicated that they had a formal training and development program for their employees, and 28.6 percent did not yet.

Table 2

#### Percentages of the formal training and development program

N=91	n	Percent
Yes	65	71.4%
No	26	28.6%

### Question 6

What type of training does your organization offer? (Check all that apply)

The survey provided three training types that organizations would offer for their employees. Over 97 percent of respondents (97.8%) addressed that they offered skilled-based training; 84 percent of respondents (84.6%) offered knowledge-based training; 73 percent of respondents (73.6%) offered attitude-based training. According to the percentages, we know that the respondents emphasized promoting their employees' skills somewhat more than knowledge and attitude.

Table 3

Percentages of training types

N=91	n	Percent
<b>Training types</b>		
Skills-based	89	97.8%
Knowledge-based	77	84.6%
Attitude-based	67	73.6%

**Question 7**

How do you develop training? Please check the most major one only.

The survey provided four training development methods. Respondents chose the one that they most often used to develop training. According to the respondents, 47.3 percent of respondents said they mostly created their own customized training. 30.8 percent of respondents mainly depended on outsource training development. 15.4 percent hired trainers to come on site. Only 6.6 percent of respondents purchased commercial training packages.

Table 4

Percentages of ways to develop training

N=91	n	Percent
<b>Ways to develop training</b>		
Create our own customized training	43	47.3%
Outsource training development	28	30.8%
Purchase commercial training packages	6	6.6%
Hire trainers to come on site	14	15.4%

## Section 2

### Question 4

Has your organization implemented web-based training?

According to the respondents, 24.2 percent of respondents had implemented web-based training, and 75.8 percent hadn't.

Table 5

#### Percentages of web-based training implementation

N=91	n	Percent
Yes	22	24.2%
No	69	75.8%

### Question 5

Does your organization plan to implement web-based training in the next 12 months?

37.4 percent of the respondents said they would implement web-based training in one year, and 62.6 percent did not have this kind of plan in the coming year. Compared with question 4, in the near future, WBT users will increase about 11 percent (11.2%).

Table 6

#### Percentages of planning to implement WBT in the next 12 months

N=91	n	Percent
Yes	34	37.4%
No	57	62.6%

**Question 8**

Which of the following training methods do you use or plan to use? Please check only one response for each item that best describes the training strategy of your organization.

The survey provided eight training methods that respondents might be using, plan to use in one year or in one to two years, or had no plan to use. When designing this question, it was assumed that if the respondents chose “using presently”, they would also use the method in the future; if the respondents chose “plan to use in 1 year”, respondents were assumed to continue using that method, too. Therefore, the responses of this question were counted progressively.

Table 7 shows the percentages of each training method that was used in different periods or not planned to use. The result in Table 7 shows that “classroom” was currently the most used training method (95.6%) followed by work manuals (93.4%). 82.4 percent of respondents used “on-the-job training” as one of their training methods; 75.8 percent used “bulletin boards or email”; over 50 percent of respondents (50.5%) used “video tapes”; 33 percent used “role playing”; 15.4 percent used “online computer conferencing”; only 11 percent of respondents used “web-based training”.

According to the results in Table 7, we know that all respondents, in one year, would use both “classroom” and “work manuals” as their training methods because

the percentages of these two methods were up to 100 percent. 93.4 percent of respondents said that they would use “on-the-job training” in two years. 86.8 percent of respondents indicated that they would use “bulletin boards or email” in 2 years. 64.8 percent of respondents revealed that they would use “video tapes” as their training method in one year, and up to 71.4 percent would these use in two years. Over fifty percent of respondents (50.6%) said that they would use “role playing” in one year and up to 66% percent would use it in two years. 26.4 percent of respondents said that they would use “online computer conferencing” as their training method in one year, but in two years, the percentage climbed to 55. Only 19.8 percent of respondents revealed that they would use “web-based training” in one year; however, in two years, over 50 percent of them (50.6%) would use WBT as their training method. In this comparison, we can understand that WBT and “online computer conferencing” were not very popular in 2001, but more and more companies would plan to implement these two methods in the near future.

The last column of Table 7 shows the percentages of training methods that respondents weren't using or wouldn't plan to use in two years. The highest percentage was web-based training (49.5%) followed by “online computer conferencing” (45.1%). The percentage of “role-playing” was 34.1 percent; the percentage of “videotapes” was 28.6 percent; “bulletin boards or email” was 13.2

percent; “on-the-job training” was 6.6 percent.

Table 7

Percentages of training methods in different periods

N=91

Training methods	currently using(%)	in 1 year(%)	1-2 years(%)	no plan(%)
Classroom	95.6	100	100	0
online computer conferencing	15.4	26.4	55	45.1
web-based training	11	19.8	50.6	49.5
OJT	82.4	93.4	93.4	6.6
role playing	33	50.6	66	34.1
work manuals	93.4	100	100	0
bulletin boards or email	75.8	86.8	86.8	13.2
video tapes	50.5	64.8	71.4	28.6

**Question 11**

Which of the following modes of Web-based training do you use or plan to use?

Please check only one for each item.

The survey provided seven modes of Web-based training that respondents might be using, plan to use in one year or in one to two years, or had no plan to use. With the same assumption as Question 8 that, if the respondents chose “use presently”, they would also use the mode in the future; if the respondents chose “plan to use in 1 year”, respondents were assumed to continue using that method. Therefore, the responses of this question were counted progressively, also.

In Table 8, we can find the percentages of the usage of each item in the different

periods, present, in one year, in one to two years, and not planned to use. Out of the seven modes listed on the instrument, the majority of the respondents (86.8%) chose email as the most used WBT mode currently. Over sixty percent of respondents (61.5%) said they were using the mode of online reference. The modes least used were interactive multimedia and online courses from educational institutions (9.9%).

It has been explained above that the number of responses of this question was counted progressively, so the percentages of all modes increased gradually from the period of present to in one to two years. From the results of Table 8, we know that 93.4 percent of respondents would use “email” as the WBT mode in one year; 75.9 percent of respondents would “download the data or courses”; 71.4 percent of respondents addressed that they would use “online reference”; 41.8 percent said that would use “online tests”; 31.9 percent would use “videoconference”; over 25 percent of respondents (25.3%) would use “interactive multimedia” as the WBT mode; the mode that would be least used in one year was “online courses from educational institutions”.

In the period of one to two years, according to the responses, the most used WBT mode would be “email” and the least used one would be “online courses from educational institutions”. The percentage of “online reference” climbed up to 86.8; over 82 percent of respondents (82.5%) said that they would “download the data or

course”; the percentage of “online tests” would increase up to 74.8; both “videoconference” and “interactive multimedia” were the two least used modes of WBT (58.3%).

Table 8

Percentages of the usage of WBT modes in different periods

N=91

WBT modes	currently using(%)	in 1 year(%)	in 1-2 years(%)	no plan(%)
Email	86.8	93.4	95.6	4.4
Online tests	22	41.8	74.8	25.3
Videoconference	19.8	31.9	58.3	41.8
Online reference	61.5	71.4	86.8	13.2
Download the data or courses	49.5	75.9	82.5	17.6
Interactive multimedia	9.9	25.3	58.3	41.8
Online courses from any college	9.9	20.9	56.1	44

### Section 3

#### Question 2

Does your organization have access to the Internet?

All of the respondents indicated that they had the access to the Internet.

Table 9

Percentages of the access to the Internet

N=91	n	Percent
Yes	91	100%
No	0	0%

#### Question 3

Does your organization have its own intranet or plan to establish one soon?

According to the result, only 5.5 percent of respondents didn't have their own intranet, and up to 94.5 percent had.

Table 10

Percentages of the use of the Intranet

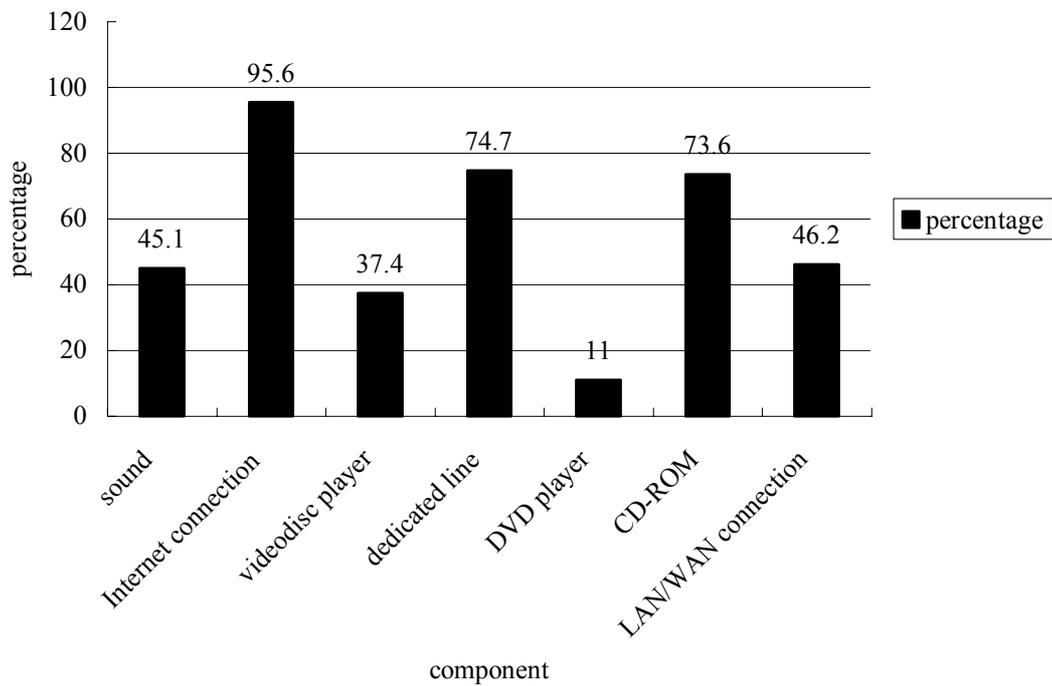
N=91	n	Percent
Yes	86	94.5%
No	5	5.5%

**Question 9**

What are the basic computers in your organization equipped for? (Check all that apply.)

Figure 3 shows that "Internet connection" represented the majority of respondents with 95.6 percent. Only 11 percent of respondents had their basic computers equipped with DVD players. The following table shows the percentages of the other computer components.

**Figure 3** Percentages of the components basic computers equipped

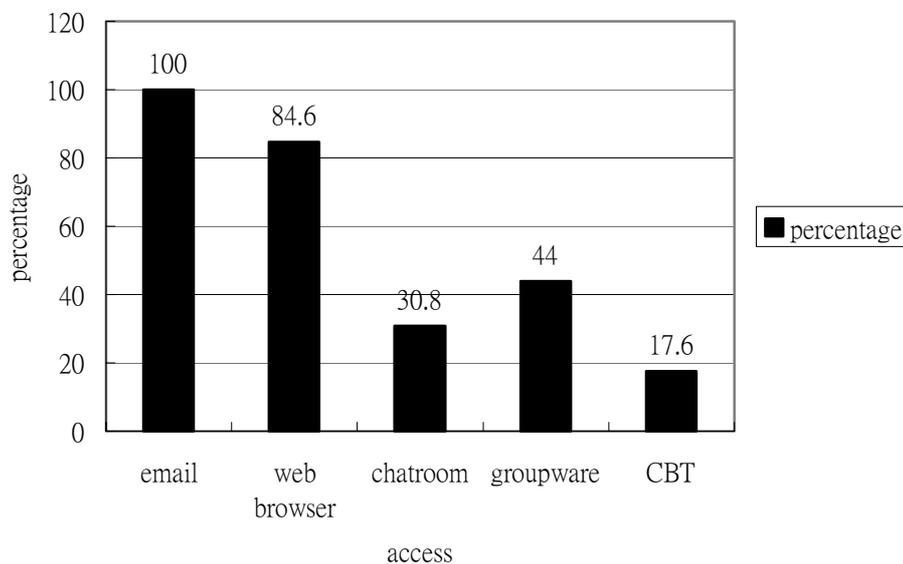


### Question 10

What access do your employees have in the office? (Check all that apply.)

In Figure 4, we understand that 100 percent of respondents indicated that their employees had access to Internet in the office. More than 84 percent of respondents (84.6%) said that their employees could use the web browser in the office. Respondents had the least access to “chatroom” in the office.

**Figure 4.** Percentages of access the employees had with the computers provided by the organizations



#### Section 4

##### Question 12

Please rate the following characteristics of WBT as advantages? Please check only one for each item.

The results in Table 11 show the percentages and rank of the advantages of WBT. Mean scores ranked the advantages of WBT. “Ease of sharing information and collaborating” was the WBT advantage that respondents agreed most with the mean score being 1.31. The second place was “multimedia capability” with a mean score of 1.35, and the third place was “reduce the training cost” with a mean score of 1.43. “Quick development time” was ranked as the 11<sup>th</sup> place with 2.34; “opportunities of

interaction” was ranked the 12<sup>th</sup> place with a mean score of 2.63. The WBT advantage that the fewest respondents agreed with was “reduce training time” with a mean score of 2.87.

Table 11

The rank of WBT advantages

N=91	M	SD	Level of Advantage					Rank
			1	2	3	4	5	
Ease of sharing information and collaborating	1.31	0.53	72.5	24.2	3.3			1
Multimedia capability	1.35	0.58	70.3	24.2	5.5			2
Reduce the training cost	1.43	0.62	63.7	29.7	6.6			3
Ease of modifying and distributing curriculum	1.53	0.79	61.5	28.6	5.5	4.4		4
Learner control	1.58	0.75	54.9	34.1	8.8	2.2		5
Variety of capabilities	1.73	0.79	46.2	37.4	14.3	2.2		6
Consistency of training content	1.77	0.8	41.8	44	9.9	4.4		7
Ability to track and schedule training	2.03	1.03	37.4	35.2	14.3	13.2		8
Ease of updating	2.29	0.98	20.9	42.9	26.4	6.6	3.3	9
Quick development time	2.34	1.1	24.2	37.4	23.1	11	4.4	10
Opportunity for interaction	2.63	1.24	22	28.6	20.9	22	6.6	11
Reduce training time	2.87	1.11	17.6	13.2	36.3	30.8	2.2	12

Note. Judgment of advantage is made on 5-point scale (1=strongly agree, 5=strongly disagree). M=Mean; SD=Standard Deviation.

### Question 13

Please rate the following characteristics of WBT as disadvantages? Please check only one for each item.

“Inappropriate for some courses” was the WBT disadvantage that respondents agreed with most, with a mean score of 1.37. The second place was “slow speed when incorporating video & graphics” with the mean score of 1.84. The WBT disadvantage that respondents least agreed with was “extra training needed for using WBT” with a

mean score of 2.21.

Table 12

The rank of WBT disadvantages

Disadvantages	M	SD	Level of Disadvantage					Rank
			1	2	3	4	5	
Inappropriate for some courses	1.37	0.53	64.8	33	2.2			1
Slow speed when incorporating video & graphics	1.84	0.92	45.1	33	15.4	6.6		2
Poor interaction	2.1	1.03	33	39.6	12.1	15.4		3
Costly	2.16	1	26.4	11	5.5			4
Extra training needed for using WBT	2.21	1.03	28.6	37.4	18.7	15.4		5

Note. Judgment of disadvantage is made on 5-point scale (1=strongly agree,

5=strongly disagree). M=Mean; SD=Standard Deviation.

### Section 5

In the last part of the questionnaire, there were four questions to identify business types, employee numbers, job titles of respondents, and additional comments about Web-based training from respondents.

IC designers or manufacturers represented the majority of respondents of almost 50 percent. The following table shows the percentages for the other business types.

Table 13

Organization Representation by Business Type

N=91	n	Percent
<b>Types of business</b>		
IC design or manufacture	45	49.5
Telecommunication and Networking	16	17.6
Electro-Optical	12	13.2
Computer and peripherals	10	11.0
Automation	4	4.4
Other	4	4.4

The results in Table 14 show that 71.4 percent of respondents had less than 500 employees; 11 percent of respondents were in the category of 1001-2000 employees; over eight percent (8.8%) of respondents were in the category of 501-1000 employees; less than five percent (4.4%) of the respondents were in the category of 2001-3000 employees, the same percentage as those with 3001 employees or above.

Table 14

Number of employees

N=91	n	Percent
1-500	65	71.4%
501-1000	8	8.8%
1001-2000	10	11.0%
2001-3000	4	4.4%
3001 or above	4	4.4%

According to the responses, 49 respondents were HR specialists and 10 respondents were HR supervisors. Except HR and training people, there was a manager of a financial department filling out the questionnaire for this study. The following table shows the number of the job titles of respondents.

Table 15

Job Titles of respondents

N=91	n
HR Specialist	49
HR Supervisor	10
HR Manager	9
Training Specialist	6
HR Assistant manager	6
Sr. HR Specialist	6
Sr. Training Administrator	2
Manager of Training and Development	2
Manager of Financial Dept.	1

**Comments of Respondents**

Some respondents provided some additional comments regarding web-based training.

1. WBT can provide opportunities for individual learning, and also reduce the inconvenience of centralized training.
2. The cost of WBT is higher than traditional training, and the interaction of WBT is lower than traditional training.
3. WBT needs better equipment, but enterprises are slow to upgrade their equipment.
4. Software packages may not be suitable for the needs of organizations.
5. WBT is an exciting training method, however, the current resources, such as wideband, cost, effectiveness, would challenge the implementation of WBT. In addition, it is more difficult to maintain courses and to interact with learners than the traditional training.

6. WBT would be a nice form of training method when it gets to a mature stage because of all benefits. However, at this stage, not all the trainees are used to the e-methods. The effectiveness of this method is also questionable. Inevitably, it will be a trend for future training.
7. WBT is the trend for the future and also an essential for a company.
8. Software packages are the only choice for those companies who don't have the ability to develop strong courses on their own. However, the lack of variety and high cost of software packages are not suitable for the training needs of our company.
9. WBT is effective only for those who have computers. For factory operators, the traditional training is more effective and efficient than WBT.
10. The scale of the company should be a factor when considering WBT. Our company is a small one so we don't think it necessary for us at this time.
11. WBT would increase the time of course development from that of traditional training. To prepare the materials of WBT, trainers have to key in all resources but the trainers of traditional training can only copy the resources from books or magazines. However, trainees can obtain more detailed and various knowledge from WBT; for the training department, WBT can help to maintain the consistency of training content.

12. WBT is a great training method. It is very lively and attractive to those who wish to participate online. However, the advantage won't exist when learners are not fond of online learning. For companies, the cost of WBT is quite expensive so only large scale companies can easily implement WBT or those with a specific group in charge of training.

### **Summary**

In summary, this chapter described the findings of the survey designed for this study. The questionnaire included 18 questions. To meet the objectives of this research, these questions were divided into five sections to identify respondents' attitudes toward training, determine their current implementations, plans, and attitudes to training and WBT, identify advantages and disadvantages of WBT that might be of concern while conducting WBT, and to determine their attitudes toward WBT.

According to the findings, we understand that most respondents presented a positive attitude toward training by providing training in all the fields, skill, knowledge, and attitude. Most respondents were still utilizing the "classroom" as their main training method; however, the percentage of companies using Web-based training would reach 50 percent in three years. This finding represents that their acceptance of WBT is quite high. In section 3 we can find that all respondents had access to the Internet and over 94 percent of them had their own intranet. Technically,

they also had quite enough hardware and software in the offices to implement WBT. In addition, most respondents agreed that WBT could facilitate information sharing and collaborating. Multimedia capability was another important advantage regarding WBT. The biggest disadvantage of WBT was the inappropriateness for some training courses. Generally, we can predict that more and more respondents would begin to implement WBT in the near future based on their positive attitudes toward WBT, even though the percentage of current usage is still low.

## CHAPTER FIVE

### SUMMARY

In this speedily changing global market, in order to be competitive and successful, companies have to manage strategically and train employees continuously. As information is doubling every five to seven years (Hendrickson, 1998), organizations have been recognizing the value of human knowledge as a resource and the need for employees to update their knowledge and skills periodically. However, the traditional training encounters many challenges meeting these needs. First of all, time away from work for training interrupts productivity. Second, a classroom-delivered course cannot provide information needed immediately. Finally, it is difficult for traditional classroom training to offer a consistent content of training. To solve these problems, organizations are increasingly relying on Web-based training (WBT), which can provide immediacy, convenience, and consistency of training (Colbrunn & Dan Tiem, 2000).

The use of WBT as a new training method is growing in the United States and Europe, due to the long distance between offices. However, WBT is still a novel concept for most Asian countries. This study was to examine companies in Taiwan, an Asian country of narrow domain but with many of high-tech industries, on their training capabilities, current implementations, plans, and attitudes that pertain to

WBT. This chapter provides a summary of the major research findings and discussions, conclusions, and recommendations for future research.

### **Findings and Discussions**

A research survey was implemented to collect data for this study. Among 272 companies in Hsinchu Science-based Industrial Park, 162 companies were randomly selected to receive the questionnaires designed particularly for this study. 99 questionnaires were returned but only 91 of them were completed fully and valid. The overall response rate was 56 percent. The majority of respondents were HR specialists; and, IC designers and manufacturers represented the majority of the business types with 49.5 percent. Among the respondents, small- and middle-sized organizations with less than 500 employees were the majority.

Objective one of this study was to identify the trends of companies located in Hsinchu Science-based Industrial Park that had access to the Internet. In chapter one, the researcher assumed that over 80 percent of organizations located in HSIP had Internet access. In Section 3 of Chapter 4, the response of Question 2 shows that 100 percent of respondents had access to the Internet; the response of Question 3 shows that 94.5 percent of respondents had their own intranet. Therefore, objective one was achieved according to the data of Section 3 in Chapter 4.

Objective two of this study was to identify the trends of companies that implemented WBT or planned to use WBT. In Section 2 of Chapter 4, the response of Question 4 shows that only 24.2 percent of respondents had implemented WBT. The response of Question 5 indicated that 37.4 percent of respondents would use WBT as a training method in one year. However, compared with the responses of Question 8, the percentages of the usage of WBT are not the same. In Question 8, only 11 percent of respondents revealed that they had implemented WBT and 19.8 percent of respondents indicated that they would use WBT in one year. Nevertheless, in Question 8, over 50 percent of respondents (50.6%) replied that they would implement WBT as their training method in two years. To sum up, according to the changes of these percentages, the usage of WBT would increase gradually even though the percentages of the same periods were not exactly the same.

Objective three was to identify the current most commonly used training methods. According to the results of Question 8, the “classroom” was still the most commonly used training method. The second most common was “work manuals”. In addition, according to the results of Question 11, the most used WBT mode was “email” and the second highest mode was “online reference”.

Objective four was designed to identify the organizational training capabilities, current implementations, plans, and attitudes that pertain to WBT. In Section 1 of

Chapter 4, from the response of Question 1 we know that slightly over 71 percent of respondents (71.4%) had a formal training and development program. The response from Question 6 shows that the respondents emphasized promotion of their employees' skills somewhat more than knowledge and attitude. In addition, the results of Table 4 show that 47.3 percent of respondents created their own customized training and more than 30 percent of respondents (30.8%) adapted outsource training development. From the responses of these three questions discussed above, we realize that the respondents of this research study presented a highly positive attitude towards training by using different ways to develop training. As discussed in Chapter 4, we understand that 11 percent of respondents revealed that they had implemented WBT, 19.8 percent of respondents would use WBT in one year, and over 50 percent of respondents (50.6%) would implement WBT as their training method in two years. Accordingly, the attitude of the respondents towards WBT was positive and would gradually increase.

Regarding the usage of WBT modes, the results of Question 11 show that the majority of respondents used "email" (86.8 %) and "online reference" was the second most used WBT mode (61.5 %). Almost half of respondents (49.5%) used "Download the data or courses" as the WBT mode. Compared with the low percentage of respondents that used WBT presently (11%) in Question 8, we may be able to suggest

that not all respondents considered all modes listed in Question 11 as WBT modes. They might think that WBT only connected with the Internet and online environment with browsers. In summary, the usage of all WBT modes would increase conspicuously in the near future.

As change is not simple but necessary for organizations, they have to consider their readiness and ability before adapting new technologies or making changes. To succeed in using WBT, it is important to consider the issues related to the organization's culture and technology (Colbrunn & Van Tiem, 2000). Thus, the research examined the organizations' hardware and software to evaluate their capability to adapt to WBT. From the responses of Question 2 we know that all respondents had access to the Internet, which means they all reached the first requirement of using WBT. As to hardware, the responses of Question 9 show that, in addition to the connection of the Internet, over 70 percent of respondents presented that they also had dedicated lines (74.7%) and CD-ROM (73.6%) with their computers. Almost a half of the respondents had the LAN/WAN connection (46.2%) and sound cards (45.1%). As a result, we know that the respondents were fairly capable to adapt WBT with their existing. Regarding the software, the results of Question 10 shows that 100 percent of respondents had "email" on their computers, and 84 percent of respondents (84.6%) had "web browser". Although the percentages

showed that the use of “chatroom”, “groupware”, and “CBT” were not high, emails and web browsers were also fairly capable of providing the basic software for implementing WBT. Therefore, the computer equipment and software would not be barriers to implementing WBT. The key point is companies’ attitudes pertaining to WBT.

Objective Five was to identify the advantages and disadvantages of WBT that concern companies located in Hsinchu Science-based Industrial Park. The biggest advantage of WBT was the ease of sharing information and collaborating. The respondents were also quite interested in the multimedia capability that WBT would bring in. The reduction of training cost was also valued by the respondents. In contrast, respondents did not think that WBT would help reduce training time or increase the opportunity for interaction with learners. As to the disadvantages of WBT, most respondents agreed that WBT was inappropriate for some courses. The slow speed of incorporating video and graphics was another disadvantage. Besides these, quite a few of respondents did not think that extra training was needed for using WBT. It revealed that respondents disagree WBT is costly.

The researcher wished to discover the correlation between the business types that use WBT and the sizes of companies. However, IC designers and manufactures and

small-sized companies presented the majority of respondents, which could not provide an objective data for the analysis.

### **Conclusion**

From the findings in the study, it can be concluded that the companies that located in Hsinchu Science-based Industrial Park plan to implement WBT in the near future. They have the capabilities to adapt to WBT based on both hardware and software and also the popular usage of the Internet. The implementation of WBT is not yet popular in Taiwan, however, according to the interests of the respondents on WBT, we can predict that companies will tend to use WBT in the future on account of its convenience, immediateness, and consistency.

Although the traditional classroom training will still be the major training method, other methods such as OJT, work manuals, bulletin boards or email, videotapes and multimedia will be utilized for training as well. According to the comments from the respondents, we learn that while they think WBT a useful training method and a possible future trend, they believe some other things are needed to support WBT, such as better computer equipment, wideband and interaction with learners. Moreover, the sizes of companies and the types of trainees also have an impact on the feasibility of WBT. It may not be cost-effective for small companies with a few employees to implement WBT. If the trainees are factory operators who

are not used to the computer environment, WBT will not be the most appropriate method to train them. Finally, training comes in all shapes and sizes and should be used according to what needs to be learned.

### **Recommendations for Companies**

As companies plan to utilize new training methods other than traditional ones, it is essential to estimate their capabilities and examine their needs and environment. There are so many different training methods. Companies are suggested to choose the most suitable methods to deliver training that can provide the core specialties planned or expected by companies. Companies can either create their own training methods and materials if they have enough human resources, or purchase outsourcing programs to assist. Different organizations need different solutions. Additionally, obtaining support from the management affects the result of WBT implementation. As discussed in previous chapters, there are many advantages of WBT; however, it requires a longer term and more technical support to develop and implement. If the management is not supportive, it would be harder to overcome possible difficulties which may accompany WBT.

### **Recommendations for Future Research**

This study was designed to examine the high-tech companies located in HSIP; therefore, the findings may not represent the situation of other industries. During the

survey period, the researcher found that banks utilized WBT much more than those high-tech companies in Taiwan. The major reason is that all banks have many branches around Taiwan so that they need WBT to deliver the latest information and training immediately and to save on traveling expenses for training as well. In contrast, most of those high-tech companies only have one or a couple of offices or factories and many of them are located in the same area. As a result, WBT is not as important as for banks or other service industries. In future study, service industries would be a potential research field in regard to training and training methods. In addition, it will be necessary to define the key words of the questionnaire before doing a survey in order to avoid misunderstandings.

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## Appendix A

1. Does your organization have a formal training and development program for your employees?  
a. \_\_\_\_\_ Yes                      b. \_\_\_ No
  
2. Does your organization have access to the Internet?  
a. \_\_\_\_\_ Yes                      b. \_\_\_ No
  
3. Does your organization have its own intranet or plan to establish one soon?  
a. \_\_\_\_\_ Yes                      b. \_\_\_ No
  
4. Has your organization implemented web-based training?  
a. \_\_\_\_\_ Yes                      b. \_\_\_ No
  
5. Does your organization plan to implement web-based training in the next 12 months?  
a. \_\_\_\_\_ Yes                      b. \_\_\_ No
  
6. What type of training does your organization offer? (Check all that apply.)  
a. \_\_\_\_\_ skills-based training                      b. \_\_\_\_\_ knowledge-based training  
c. \_\_\_\_\_ attitude-based training
  
7. How do you develop training? Please check the most major one only.  
a. \_\_\_\_\_ create our own customized training                      b. \_\_\_ outsource training development  
c. \_\_\_\_\_ purchase commercial training packages                      d. \_\_\_ hire trainers to come on site



11. Which of the following modes of Web-based training do you use or plan to use? Please check only one for each item.

<u>Modes</u>	<i>Use presently</i>	<i>plan to use</i>	<i>plan to use</i>	<i>no plan</i>
		<i>in 1 year</i>	<i>in 1-2 yrs</i>	
a. e-mail	_____	_____	_____	_____
b. evaluation	_____	_____	_____	_____
c. videoconferencing	_____	_____	_____	_____
d. online reference	_____	_____	_____	_____
e. downloading	_____	_____	_____	_____
f. interactive multimedia	_____	_____	_____	_____
g. online courses from educational institutions	_____	_____	_____	_____
h. other _____	_____	_____	_____	_____

12. Please rate the following characteristics of WBT as advantages? Please check only one for each item. (1= strongly agree; 2=somewhat agree; 3=neutral opinion; 4=somewhat disagree; 5=strong disagree)

<u>Advantages</u>	1	2	3	4	5
a. Ease of modifying and distributing curriculum	_____	_____	_____	_____	_____
b. Ease of sharing information and collaborating	_____	_____	_____	_____	_____
c. Reduce costs of printing, mailing manuals, CD-ROMs and traveling	_____	_____	_____	_____	_____
d. Multimedia capability	_____	_____	_____	_____	_____
e. Quick development time	_____	_____	_____	_____	_____
f. Variety of capabilities	_____	_____	_____	_____	_____
g. Ease of updating	_____	_____	_____	_____	_____
h. Learner control	_____	_____	_____	_____	_____
i. Opportunity for interaction	_____	_____	_____	_____	_____
j. Ability to track and schedule training	_____	_____	_____	_____	_____
k. Consistency of training content	_____	_____	_____	_____	_____
l. Reduce training time	_____	_____	_____	_____	_____

13. Please rate the following characteristics of WBT as disadvantages? Please check only one for each item. (1= strongly agree; 2=somewhat agree; 3=neutral opinion; 4=somewhat disagree; 5=strongly disagree)

Disadvantages	1	2	3	4	5
a. Poor interaction	___	___	___	___	___
b. Costly	___	___	___	___	___
c. Inappropriate for some courses	___	___	___	___	___
d. Slow speed when incorporating video & graphics	___	___	___	___	___
e. Extra training needed for using WBT	___	___	___	___	___
f. Other _____					

14. Do you have any additional comments about Web-based training?

*Comments:*

- Please check the business type that most accurately represents your organization.

- a. \_\_\_ Integrated Circuit Design or Manufacture  
 b. \_\_\_ Telecommunication and Networking  
 c. \_\_\_ Automation  
 d. \_\_\_ Computer and Peripherals  
 e. \_\_\_ Electro-Optical  
 f. \_\_\_ Biotechnology  
 g. \_\_\_ Other

- What is your job title? \_\_\_\_\_  
 \_\_\_\_\_

- How many employees in your organization?
- a. \_\_\_ 1-500
  - b. \_\_\_ 501-1000
  - c. \_\_\_ 1001-2000
  - d. \_\_\_ 2001-3000
  - e. \_\_\_ 3001 or above
- Would you like to receive the results of this survey?
- \_\_\_\_\_ Yes (then the researcher will mail you the results after the analysis is finished)  
(your email address \_\_\_\_\_ )
- \_\_\_\_\_ No

~ ***The end! Thank you very much!*** ~

Please return this survey by **August 1, 2000**. If it is not received by this date, the researcher will contact with you by phone to check if you have received this survey. Thank you for your time and cooperation.

## Appendix B

Dear Training/Human resource Director,

I am currently a graduate student at the University of Wisconsin-Stout majoring in Training and Development. I am executing a study to determine the use of Web-based training in the high-tech industry of Taiwan. I am collecting the data for this study via mail surveys. I would appreciate the effort you put forth to assist in the accomplishment of this study.

WBT is growingly used as a new training method in the United States and Europe, due to the long distance between offices. However, WBT is still a novel concept for most Asian countries. This study is to examine companies in Taiwan, an Asian country of narrow domain but with lots of high-tech industries, on their training capabilities, current implementations, plans, and attitudes that pertain to WBT. This study will survey companies located in the Hsinchu Science-based Industrial Park, which is the most important high-tech area in Taiwan. High-tech industry is always the pioneer of Taiwanese industry on development of new technologies and ideas; therefore, by surveying these companies, this study will provide the most accurate information of the trend of WBT use in Taiwan.

You have been selected for this research based on the specific location of your organization. Please take time to answer the following 14 questions. The information you provide will significantly help identify how Taiwanese companies have taken advantage of new technologies and the Internet for training. Please use the enclosed envelope to return your completed questionnaire by July 14, 2000. If you have any question regarding the study, please contact me at your earliest convenience. I need your contribution enormously. This survey will remain strictly confidential.

Sincerely yours,

Chia-Yi Chao

Encl. Research Questionnaire

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