

## CHAPTER IV



### **Computer Aided Instruction on CD-ROMs for Learning at the Workplace Program: College of Public Health, Chulalongkorn University**

#### **4.1 Introduction**

Today several academic institutions create continuing education programs for students to acquire a college degree regardless of where they live and work and offer distance courses to students. The main role of distance learning is to assist in the integration of new technology and methodologies for distance learning in educational systems (St-Pierre, 2000a). Studies report that distance learning is a very big trend, and steadily and quickly growing (National Center for Education Statistics, 1997, O'Leary, 2000a). Distance learning courses can be offered at one half to one-third the cost of a conventional course (O'Leary, 2000b), and additional students are not limited by constraints of time or place and can exercise a more independent style of learning (Dewald, 2000a).

Technology-assisted distance education has become increasingly common and important in recent years. Technology continues to develop allowing us to improve the effectiveness of distance education and overcome traditional barriers (Klus, 1995). Electronic mail and computer networks like Internet and World Wide Web offer learning opportunities anywhere to anyone at anytime (West, 1999) and have also produced opportunities for sharing information and instruction (Klus, 1999). Milliron and Myer (1999) note the rapid assimilation of the Internet and its associated technologies: “they quickly and easily increase an educator’s capacity to help students make connections to content, context, and community resulting in more powerful learning experiences overall”.

Libraries have worked within the arena of electronic information systems and resources for many years leading up to wide scale introduction of the Internet, particularly within academic environments. With the greater awareness of the key role of learner support as gatekeepers for individual learning programs (Pye, 1999), libraries, whose customers include distance learners, should look upon distance learning like any other sort of information tumult, as an opportunity to extend their role (O’Leary, 2000). In the workplace, often students are left to discover innovative techniques for themselves without being guided to locate the individual benefits of the a “big picture” of learning into which they fit (Pve, 1999). Although many students come to the college with increasingly sophisticated computer skills, students should be helped in the beginning to learn to access information from the Internet, as Heins et al. (2000) suggest. They also suggest that with an increase of Web sites on the Internet, it

is important that students learn to be discriminating in the sources they use to gather information.

It is critical to ensure that distance learners know best how to use Internet effectively. Hence, creativity in using the Internet and the information provided in Web sites are critical in facilitating a connection between students and the real world. The purpose of this paper is to develop and evaluate an interactive multimedia resource, the Computer Aided Instruction CD-ROM or CAI on CD-ROM. The CD-ROM is designed by the library to be used by students of the College of Public Health but is particularly aimed at those enrolled part-time and the Learning at the Workplace Program. The CD-ROM will consist of 4 parts: Part I is an interactive part on “How to access public health information sources” and includes an exercise part. Part II “Presentation on CD-ROMs”; lists of college publications will be the content in CD-ROM. Part III provides information on related subjects of public health for students to link to, and many other provides Internet sites. Part IV “Instruction on how to contact information center staff”.

Although most academic and corporate libraries already provide remote access to materials, commonly including journals, newspapers, magazines, and reference books, distance learners have special requirements. They may require access to resources that the library may not have. And, by the definition, distance learners find it difficult or impossible to use resources that have traditionally been available only at the library itself, such as reference books and course reserve material. Searching for information today is easy, but finding what students want requires more skill. This

means that students need to understand where information is most likely to be found, how it's organized and how to retrieve information effectively using computerized search tools.

One of the reasons for producing the CAI CD-ROM is the perceived need to offer such students alternative modes of learning support. Previous studies argued that the flexible structure or interactive multimedia materials may be effective in meeting the individual needs of student while the use of affective material (in the form 'peer voice') may help to build the confidence, and reduce the isolation, of the distance learner (Barret et al., 2000).

## **4.2 Background**

### **4.2.1 Distance Education**

Distance education is a process that creates and provides access to learning when time and distance separate the source of information from the learners (Ping, 1998). Its initiatives have played an increasingly important role in the goals of colleges and universities in recent years, and the trend seems likely to continue and quickly growing (Dewald, 2000b, O'Leary, 2000d, Donlevy, 2000). The process of learning is taking courses and training over the Internet and other media i.e. Web-based technology, CD-ROM technology, video conference, television, mail, telephone, and fax (St-Pierre, 2000b, Zhang, 1998), which is radically altering the ways in which all sorts of education are delivered. Today, a large majority of higher education

institutions, from community colleges to universities, offer distance learning. There are, by one estimate, 6,000 courses online. In 1998, 5% of college and university students took distance learning courses; by 2002, this share is expected to be 15%, and can only grow after that (O'Leary, 2000e). The incentives to pursue distance learning opportunities are strong both for institutions and students. Institutions can increase their market beyond geographical boundaries, whereas students are not limited by the constraints of time or place and can exercise a more independent style of learning. There is motivation for educational institutions to adopt the premise that all barriers imposed by distance can be surmounted, particularly because recent technological advances offer hope for creating learning communities electronically (Dewald, 2000c). The studies of Thompson (1998) mentioned that distance learners are on the average, older than typical undergraduates and are more likely to be female, to be employed full-time, and to be married. They are practical people, more concerned with cost, content, quality, and convenience, than with a prestigious name institution (O'Leary, 2000f). Moore (1998) also found that, compared to conventional students, distance learners were remarkably motivated, were task oriented, and were usually forced to study in a less favorable education environment.

#### **4.2.2 Learning at the Workplace Program**

In 1996, the College of Public Health launched a distant education program called "Learning at the Workplace Program (LWP)" in 6 provinces; Chonburi, Ayuttaya, Phayoa, Khonkaen, Roi-et and Yasothorn to serve approximately 66 students. The main role of this program is to promote equity and efficiency of education

for health officers functioning in rural and provincial settings (Chitr Sitthi-amorn, 1999a).

LWP focuses on providing critical thinking skills and learning through problem solving by students. It is expected that through provision of information to the student it will be possible to have a direct and positive effect on the competency of the students. This program is self-study, and learning by doing with actual work situations which involve the use of innovative materials and technologies such as computer-mediated communication (CMC). Alavi (1994) notes that learning is believed to be expedited in challenging problem-solving situations in which mental models are tested, extended, and refined until they are reliable in solving the problem. Theories in distance education research particularly indicate that distance students tend to experience situated learning and problem-based learning (Savery & Duffy, 1995, Streibel, 1991). Lovin (1992) have supported the idea that this program can use the experience of the workplace to better understand the nature of the job. He believes that experience is the best teacher and the best learning is doing. So, knowledge and skills are taught in the context of this program reflecting how the knowledge will be used in real-life situations. However, three Australian studies identified limitations of workplace learning which included inappropriate knowledge, lack of access to activities, expert reluctance, absence of expertise, opaque knowledge, and problems with instructional media (Billett, 1996).

The program has a length of 2 years; the first year has 3 modules composed of the Situation Analysis of Population module (SAP), the Situation Analysis of

Organization module (SAO), and the Situation Analysis of Individual module (SAI). In this LWP course, each module has 3 distinct periods (four day plenary, monthly visit, and a remote home study period); different strategies are used for each period. For the plenary, a scenario is used to demonstrate steps or the process of all modules. By this way, students understand an overview of all the content to be delivered throughout the SAP. Then they are able to do group and individual work. For the home study period, students use what they have learned to complete individual or group assignments. During this period, individual and the project assistance, using available technologies, become the primary concern. The goal is to ensure that students get timely assistance and feedback, finish individual assignments on time, and most importantly, finish projects by integrating their knowledge and skills. For the monthly visit, the academic staff have to journey to the provinces once a month to teach LWP students. After class, students have to submit the assignment via mail, fax or e-mail to the academic staff. In the second year, students develop proposals, and implement for evaluate and write report modules. For this year, LWP students have to search more information to support their report or thesis. A difficult task is finding information to support their report/thesis (i.e. reason, argument and evidence) and accessing information. These things keep the students from having sufficient information to argue his/her study. This style of teaching and learning provides public health workers with more critical thinking skills without which they might not achieve the learning objective as described above. Therefore, information resources on related subjects will be significant for their searching. The College realizes that Thai public health system will be developed by extraordinary methods. Therefore, learning at the workplace is becoming an important part of most modern educational systems and is very challenging (Bates, 1995, Zhang,

1998a); this is the way to support human resource development in the medical and public health fields. The relationship between learning at the workplace and the educational system has been clearly illustrated. Moreover, in order to meet the needs of growing organizations, education also needs to develop, especially in all developing countries where financial and material resources cannot yet be mobilized to the same level as in the developed countries.

Recent internal evaluations and discussions of stakeholders at the College showed that the curriculum for LWP has relied heavily on internet and library-based facilities but is deficient regarding the situation in rural areas where these public health officers work (Chitr Sitthi-amorn, 1999b). So why does the College conduct LWP? The reason is that the current policies of educational institutions or schools of public health are concerned only with achieving the international standard of education and do not give enough attention to public health officer's concerns. Therefore, they do not really solve the problems in rural areas.

LWP, which facilitates learning and solving real local problems by public health officers, can correct the deficient program of schools of public health and meet the needs of people in rural areas. The College believed significant education can be carried out not only in schools and universities but has to take place outside schools, after graduation, in the community and at the work sites. Information and library-based facilities using various media can disseminate crucial information for LWP education.



### **4.2.3 Technology and Distance Learning**

Technology-assisted LWP has involved traditional technologies such as mail, telephone, fax, and computer systems such as Internet. With the increasing availability of distance education, technology-assisted distance education has become increasingly common in recent years (Zhang, 1998b) and is evolving from traditional technologies (as describe above) to innovative technologies.

Bates (1991) notes that the main advance in distance education will come from technologies that allow increased learner interaction, and will evolve from those based on lectures. The important point, he contends, is not merely to use interactive technologies to connect people, but to maximize social interaction. Although there are many technologies for transferring information or distance courses, the actual uses of technologies, less costly materials (such as CD-ROMs) and information on technology is significant. It is critical to ensure that learners know how best to use emerging technologies, how to evaluate their validity, and also how to communicate effectively with others using electronic means (Lemke, 2000). Not only is it important for learners to be able to use technologies effectively, but it is also important for instructors to know effective strategies for using technology to enhance education. Most educators agree that technology helps learners in providing motivation for learning, especially Internet technology and Web-based materials which involve putting curriculum materials online etc.

#### **4.2.4 Distance Learning and Libraries**

The Information Center of the College of Public Health functions as the service center which must consider how to serve students appropriately and effectively, especially for workplace students who have a limitation in using information at the College. Materia (1994) said that health libraries are one of the most cost-effective, appropriate and realistic tools of continuing education, for instance in on-the-job training and supportive supervision. Furthermore, libraries can help health workers in rural areas to combat feelings of performance isolation and can increase the self-reliance of local health systems. They can contribute to the dissemination of information on primary care, serve as a literature resource for planners and evaluators of health services, and facilitate the retrieval of information generated in the system to which they belong.

Learning materials provided by the Information Center emphasize health system development and related subjects and are acquired to serve students. Sharing resources with other library institutions or faculties is an important ongoing responsibility, in addition to decrease document duplication, to save expenses and to effectively use space. But, the Information Center still emphasizes service delivery. The book collection comprises more than 1500 titles. A subscribed journal collection begun with 3 titles has grown to 15 titles. Library services such as literature searching on Internet or some databases and computer training are heavily utilized.

Library services provided to users consist of; online searching, various databases subscribed by the university, Internet, gathering bibliographies on specific

subjects, circulation, interlibrary-loans, and photocopying. Types of users are divided into 2 main groups; general users; graduate and postgraduate students, and researchers in Chulalongkorn University and from other institutions.

The College of Public Health Students are divided into 2 groups; (i.) In-house students, who study in the master degree program & short course training. Eighteen students enrolled in these courses during the 1998 academic year (Annual report, 1998), and 25 more students in the 1999-2000 academic year (ii.) Learning at the Work Place (LWP) students who study in the master degree program in Chonburi, Ayuttaya, Phayoa, Khonkaen, Roi-et, Yasothon and Ubonratchanee provinces. In the 1999-2000 academic year, there were 12 more students.

The number of students is increasing, especially LWP students, giving the College a good opportunity to have public health officers attend the program. This assisted method for expanded learning and teaching makes the program an ideal network at the provincial level, and solves real problems at the provincial level.

With the number of students increasing, the information center 's administration has developed in terms of services provided to support the entire program. Hence, the need to determine how services can most effectively be disseminated to cover the LWP students.

A needs assessment study was done by using a questionnaire with 66 students during in 1998 academic year; this assessment found that 34% of LWP students came

to use the service provided, while 66 % of LWP of students have never used the facilities. The LWP student's reason is that the limitation on time, opportunity, finance and distance. The majority of the students stated that distance was the major obstacle for accessing information, though services were already provided as the above details i.e. INTERNET, On-line etc. *Accessing information or literature from multiple sources in multiples formats; CD-ROM, Internet, WWW and the University Library Network* was the first priority of services that students needed from the Information Center of the College (see the priority part in Chapter III).

LWP students who enrolled in 1999-2000 academic year still have limitations on time, opportunity, finance, and distance in using services provided.

Even though some LWP student organizations have already established an INTERNET/ On-line system or the students have their own computers with INTERNET established for searching information, some of them lack the searching skills leading to get the low qualitative and quantitative information. Therefore, self-learning and critical thinking skills for solving any problem could not be completed.

How to access and use relevant and reliable public health information has to be communicated and practiced by related responsible persons. Therefore, the optional tools to contribute to and increase accessing and distributing public health information has been sought.

The use of Computer Aided Instruction (CAI) is rapidly becoming one of the most influential media of instruction in educational environments (Ross & Schulz, 1999). CAI is one of educational technologies for transferring information to distance education. The lessons and exercises inside CAI are designed as interactive question-and-answer sessions. The learner has complete freedom of navigation through the materials. Previous generation of CAI has met with limited but increasing success and acceptance (Daneil, 1999). Faced with increasing classes, heavier workloads, and distance, CAI on CD-ROMs as a means of supplementing classroom instruction is appropriate for the Information Center. (Fletcher-Flinn & Gravatt, 1995 cited in Rath, Rieck & Wadsworth 1998). It was revealed that CAI on CD-ROM can easily assist to access information or literature from multiple sources in multiple formats; CD-ROM, Internet, WWW, the University Library Network and other current knowledge on public health information contributed by the College (i.e. research reports, the College publications, theses, books, and journals ).

Therefore, this study proposes to study the development of an interactive multimedia resource on digital public health information by using CAI through CD-ROMs to enable LWP students to access public health information by enhancing searching skills.

#### **4.2.5 Justification for Selecting CD-ROMs Channel**

Optical storage technology is used increasingly in many educational institutes to provide users with large amounts of information in interesting and unique ways. The most common optical storage devices are CD-ROMs. These formats allow

large amounts of text, graphics, pictures, and movies to be stored on a small disk. A CD-ROM, for example, gives the user access to 170,000 pages of text and 1,000 graphics. Most often, text and animation are mixed with photos and videos. A CD-ROM can store up to 650 mb of information, whereas a 3.5 –inch high density disk can store up to 1.44 mb of information. To function, CD-ROMs require a computer equipped with a special player. Most educational institutes desktop computers come with CD-ROM drives that are built in as standard equipment (Dorman, 1997a). CD-ROM is the best choice for an organization which considers producing and receiving public health information important but is limited in its ability to establish Internet access. CD-ROM technology has been very useful in providing **supportive and less costly materials** for education. (Farina, 1995, Miller, 2000).

CD-ROMs have been used many ways in education including encyclopedias, interactive storybooks, and databases etc. There are advantages when using a CD-ROM: massive storage capacity; digitized video and audio; rapid and random access; durability of data storage and original contents that can't be changed (Dorman, 1997b). CD-ROM technology can bring instructional advantage to the classroom. Learners can individually access information at their own learning pace. It is not necessary to acquire many **human resources** (i.e. facilitators or subject specialists) for teaching because of manuals provided.

CDs offer access to large amounts of information to learners who may otherwise **be unable visit libraries because of distance**.

Dorman (1997c) also stated that CDs that contain sound and picture provide good feedback for the learner who need extra reinforcement. In addition, most of CDs allow the learner to take an active approach to learning. The multisensory nature of the medium gives learners more cues, which may lead to increased learning and remembering. CDs may increase routes for incidental discoveries and links to other unexplored topics.

Use of CDs can enhance computer literacy and the ability to manage electronic information, an increasingly important life and vocational skill.

Therefore, the optional way to increase accessing and distributing public health information by using CD-ROM package will be appropriated.

### **4.3 Goal and Objectives**

The goal of the project is to enable LWP students to access public health information by enhancing searching skills. The proposed study objectives derived from this goal are:

- To develop an interactive multimedia resource, the Computer Aided Instruction (CAI) on CD-ROM, to be used by LWP students.
- To evaluation an interactive multimedia resource, the Computer Aided Instruction (CAI) on CD-ROM, in real cases.

## 4.4 Methods

The primary methods for achieving the goal and objectives of the project will be:

- First phase “Developing the CD-ROM”.
- Second phase “Evaluation of the CD-ROM”

### **First phase: Developing the CD-ROM**

Before determining the CD-ROM content, an information services for students of the College of Public Health needs assessment and priority setting was used to identify the situation. Finding, accessing and dissemination information is the first priority for supporting more effective learning, but distance is the major problem for LWP students. It limits their time for learning and using all services. Consequently, learning is restricted. Therefore, the strengths and weaknesses of various channels must be studied to find an appropriate way of finding a useful, reliable solution to this problem. An appropriate way for disseminating information is CD-ROM, which is suitable (for the situation, time, place, access and cost) when compared with other alternatives. The important thing is what happens when the information reaches the students it is aimed at. The contents will be contained in the CAI on CD-ROM as follows;



## CONTENTS

- Part I: CAI on CD-ROM

The content of “How to access public health information sources?” This will describe the way to access the following sources and the result after searching; University Library Network, INTERNET, Medical Library. At the end of this part, data exercise for testing the understanding will be provided.

- Part II: Presentation on CD-ROMs

The lists of the following college publications will be contained in CD-ROMs, with the detailed of bibliographic data and abstracts consisting of; research reports, theses, books, and current content of subscription journal with abstracts including 9 titles.

- Part III: Links to Other Sources of Information (For Internet Availability)

Many other Internet sites such as those operated by the World Bank, World Health Organization (WHO), universities, and research institutes have relevant valuable public health information. These sites will be identified and links established with the CAI. For example, the WHO site is very useful for the medical and public health field, containing up-to-date information on communicable diseases, vaccine preventable diseases, environment, reproductive health, health policies, health statistics, health systems, health technology and lifestyle.

- Part IV: How can the Information Center Staff Assist You?

This part will let users know the way to contact the information staff in case they would like to receive more information or they need any help. The Email address of the Information Center Staff and postal address will be provided for contact.

In this phase, resources will be obtained and experts contacted (human resources and hardware resources) as follows;

- Human resources;

- *The content expert or Librarian* is a responsible for collecting, constructing and arranging the content of public health information by searching on CD-ROM and for making the content valid, accurate and reliable. The librarian is also responsible for keeping contact with the media expert, graphic designer, and programmer for consultation in case problems occur.

- *The media expert* will be a Graphic Designer who makes the content more attractive by good composition i.e. sound, animation, picture and color etc.

- A programmer who can suggest related software to be used.

## **Hardware**

- *CD-ROM* (Master Disk for reading & writing) and disk for copying

- *CD-Writer* 1 set to read and write the content in CD-ROMs

- *Scanner* which is available at the College. During the production

process, the Information Center staff will cooperate with the academic administration staff for utilize existing hardware.

## **PRODUCTION STEPS**

- Pre-Production Steps.
  - Review related literature in order to collect and arrange information
  - Design concept of the content; how to access and search public health information databases, how to search and access books and publications of the Chulalongkorn Library Network and an exercise for testing understanding the content.
  - Define objective of the content to let the students know it is a simple lesson; later more difficult lessons will be produced.
  - Prepare storyboard of the content
- Production Steps
  - Assign the related pictures for the content and scan these in digital format
  - Compress completely digital content in CD
  - Test the CD-ROM to determine whether it works or not with relevant persons ( i.e. academic staff, in-house students) to receive more suggestions
  - Adjusting the CD-ROM
  - Construct the manual on how to use this CD-ROM and provide instruction on the capability of CD-ROM and CD-ROM reader ( i.e the limitation of CD-ROM, speed required, CD-ROM density, the introduction how to use CAI on CD-ROM, and how to maintain CAI on CD-ROM)

## **Second phase: Evaluation of the CD-ROM**

This phase is the most complex and time consuming. The phase consists of three steps. The three steps of this phase are as follows;

### 1. *Testing the CD-ROM in this case.*

Testing the CD-ROM will be carried out in accordance together with the instruction for use CD-ROM. CD-ROM will be send to LWP students and Chonburi Learning Center by mail (1 CD-ROM package/ a student). Testing the CD-ROM, covered the following areas; *installation problems, screen design, and content*. After using CAI on CD-ROM, about 2-3 months, monitoring and evaluation tool will distribute for LWP students to obtain other suggestions, information for consideration and improving the content next edition/ version of CAI production. Evaluation tools include questionnaires, which will record their information, *suggestions on CAI usefulness, installation problems and content* ( i.e. trend of needs for CAI, to carry out the production or not). The *details of questionnaire* will consist of 3 part as followings; *part I* : General information of LWP students, *part II*: Evaluation on the content, satisfaction of students with CAI on CD-ROM, How can it be improved, frequency of use, and *part III*: Evaluation of the program to know it is easy for use or not.

### 2. *Adjustment of the CD-ROM.*

On this step the adjustment of the model will take place after received all questionnaire back from LWP students. Some new aspect might be found when testing the CD-ROM, which were not considered when developing the CD-ROM on the first phase.

### 3. *Continue testing* (send adjusted CD-ROM to LWP student again)

On this step, the need for further testing/adjusting of CD-ROM will be determined, and the repeating all the steps on this phase.



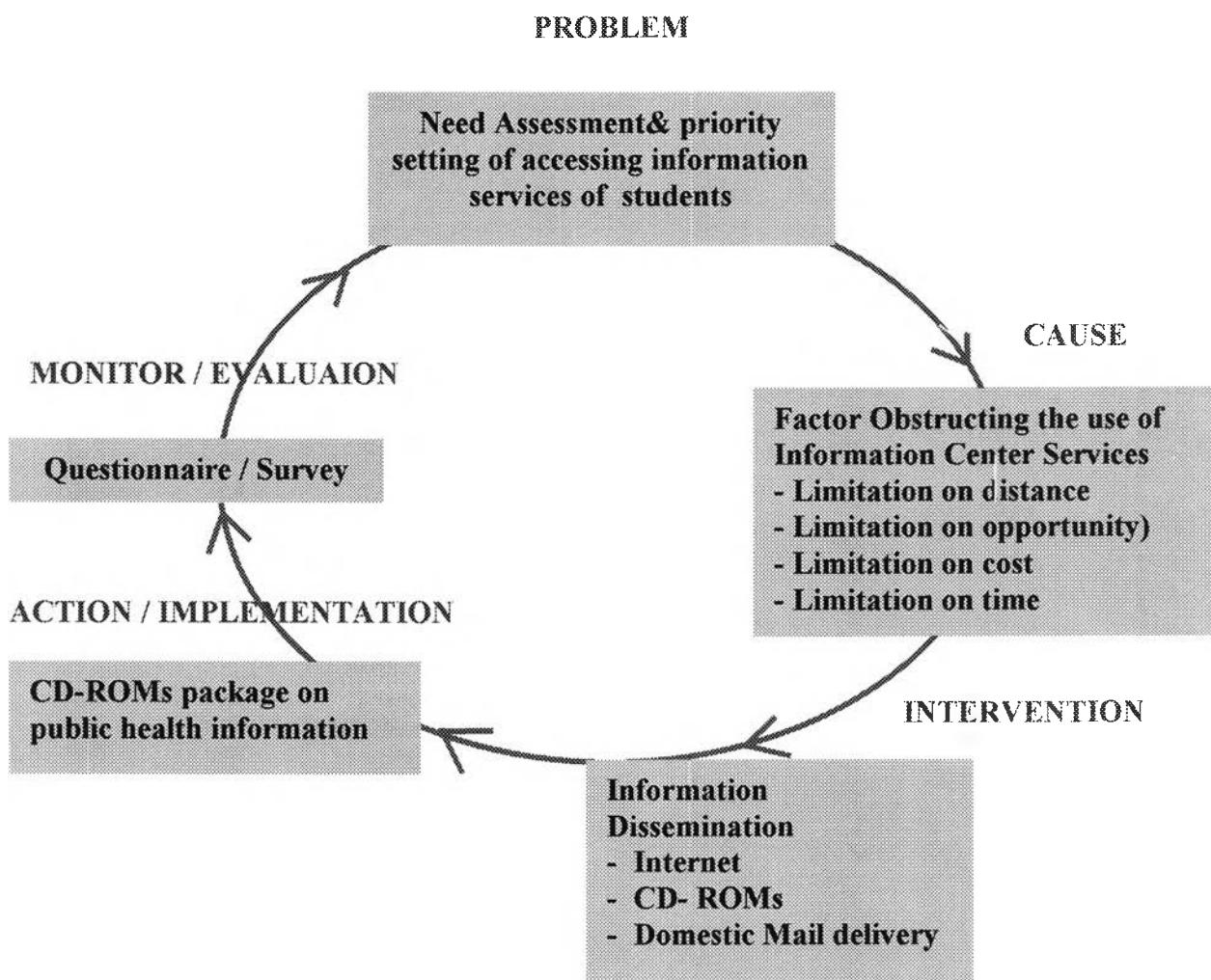
#### 4.4 Estimated Budget

Items	Fiscal Year 2001	Others	Total
<b>1. Personnel</b>	50,000	-	50,000
1.1 Media Expert			
1.2 Graphic Designer			
1.3 Programmer			
<b>2. Hardware Accessories</b>			
2.1 CD-ROM			
- Master Disc (Read & Write capacity) ( 150 B/Disc x 2 Disc)	300	-	300
- Read only disc (40 B/Disc x 10 Disc)	400	-	400
2.2 CD-Writer	13,000		13,000
2.3 Scanner	-	(already available at the College)	
<b>3. Stationary for the entire process</b>	7,000	-	7,000
3.1 Paper			
3.2 Copy expenses/ biding			
- Questionnaire for Evaluation			
- Manuals			
- Summary report			
- Mail & envelope			
<b>4. Incidental expenses</b>	1,000	-	1,000
<b>TOTAL</b>	71,700		71,700

#### **4.7 Expected Outcome**

After completion of this project, CAI on CD-ROM package will be an interactive multimedia product which can help the LWP students to learn how to access and search public health information more effectively, encouraging them in self-learning through media. And it will enable them to receive more information on public health provided by the Information Center of College. All recommendations from respondents will be seriously considered when revising the CAI, and in developing the library's new strategic tool for public health information dissemination. The result also will be necessary to validate any judgment about the effectiveness of the information and the library service in supporting learning and teaching. It will be also used as baseline data for future comparisons and to set up intervention programs.

**Figure 3.3 MODEL OF THE STUDY**



(Modified from the Technology Assessment Iterative Loop: Tungwel et al, 1995)



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