Development of A Web-based CAI Program for Maternity Nursing Practice

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Abstract

This quasi-experimental study was conducted to explore what kind of impact a Web-based educational program can have on nursing students and how nursing students react to this educational program. A Web-based computer assisted instruction for maternity nursing practice was developed by researchers using Instruction System Design model and serviced for nursing students on the WWW. To study educational effect of this program on nursing students 30 senior students at a school of nursing were selected. They were assigned into experimental and control groups based on their maternity nursing practice schedule. The effect of the Web-based CAI was measured using Achievement score, attitude toward learning experience and attitude toward computer and Internet, and compared between two groups. There were significant differences between two groups in achievement and attitude score. And students in the experimental group showed positive response to the Web-based CAI program. These results suggest that Web-based CAI is useful as a new teaching tool for maternity nursing practice as well as other nursing courses. Comments on program improvement and operational issues were collected from students. These will be used for program improvement in future.

Keywords

CAI in Nursing, Web-based CAI in Nursing, Maternity Nursing Practice

Introduction

World Wide Web(WWW) is becoming a major way of acquiring information in all scientific disciplines as well as the business world. Recently as Internet sites for educational purposes are increasing, Web-based education services are emerging as one of the major means for fast distribution and exchange of up to date teaching resources using communication technology. Web-based education has great future implications for nursing education. But there have been a very few studies on their educational effect on nursing, students' response to these programs and utilization of these Web-based programs.

Traditional teaching methods used widely in nursing education assume that all students have similar entering level of knowl-

edge, and achievement is expected to be normally distributed with only a few achieving mastery. According to Bloom's theory of mastery learning [1], "most students can attain a high level of learning capability if instruction is approached sensitively and systematically, if students are helped when and where they have learning difficulties, if they are given sufficient time to achieve mastery, and if there is a clear criterion of what constitutes mastery."

Nursing education like other health care discipline has unique instructional environment in that it requires not only traditional classroom instruction but also clinical practice. Nursing as a discipline which deals with human lives demands mastery of learning objectives. But there are many problems to achieve mastery with current nursing education. This led to development of new instructional methods.

The availability of online resources for nursing information and knowledge challenge us to reconceptualize the process of health care delivery and nursing education. By providing students with necessary information and instructional content in a systematic way using this teaching strategy, individualized learning can be achieved according to student needs. But the issues are what kind of knowledge we are going to provide, how we are going to organize and provide it, and what the students reactions will be.

With this background, a Web-based CAI program for maternity nursing practice was developed and applied to senior nursing students, and the educational effects of the program and students' reaction to the program were examined and analyzed.

This study was conducted to addresses following questions:

1. Does our Web-based CAI program for maternity nursing practice improve students achievement?
2. Does our Web-based CAI program for maternity nursing practice affect students' attitude toward learning experience?
3. Does our Web-based CAI program for maternity nursing practice affect students attitude toward computer and Internet?
4. What are the students' reactions toward the Web-based CAI program for maternity nursing practice?

Materials and Methods

A Web-based CAI program for maternity nursing practice was developed by researchers based on the Educational Software Design and Development Guide published in 1996 by Korean Educational Development Institute [2] and ISD (Instruction System Design) model that has been used widely in instructional design for tele education [3]. Also, the aspect of real time online program to be running on the Internet was taken into consideration.

During the system analysis stage, objectives of the program were set, content to be included in the program was selected, and characteristics of the students were investigated. During the system design stage, selected content was analyzed and strategies to present the content in a most effective way and links between content were sought. During the data collection and development stage, source materials of selected subject matter were gathered, modified and organized systematically with instructional strategies. In addition to text, photos, images, graphics and animation were acquired and developed. During the implementation stage, the program was written, loaded on the Internet, used by students, and data were collected and analyzed.

To address the study questions, 36 senior students at a college of nursing in Seoul were selected for the study. They were divided into four groups based on their maternity nursing clinical practice schedule. The first two groups were assigned to a control group, and the other two groups were assigned to an experimental group to minimize the diffusion effect of Web-based CAI program.

Our web-based CAI program was written using HTML 3.0 documents. A WebSite 1.1 professional version running Windows NT 4.0 was used as a WWW server. Program was authored using Hotdog, Microsoft Internet Assistant, simple text editor, Adobe Photoshop, Corel Draw and Visual Basic. The program is served through Internet accessible SNUnet (Seoul National University network)

The purpose of the Web-based CAI program for maternity nursing practice is to facilitate knowledge acquisition and understanding the clinical practice environment by providing learning content with instructional strategy. The program consists of five subjects: normal pregnancy and anatomy, normal labor, fetal monitoring, Cesarean section, high risk pregnancy. The program menu also had case study examples, a problem bank, and questions and answers facility. Learning materials were presented with graphics, photos, images and animation.

This quasi-experimental study proceeded as follows:

Step 1: Study subjects were recruited and the purpose and procedure of the study were explained after consent forms to participate in the study were collected. Before actual treatment was given GPA and test scores for maternity nursing were collected as part of a pre-test. Subjects were assigned into two groups based on their clinical practice schedule.

Step 2: Subjects assigned to the experimental group used our Web-based program at their convenience during their clinical practice periods at the statistical consulting lab at the College of

Nursing. And subjects assigned to the control group had only traditional small conferences.
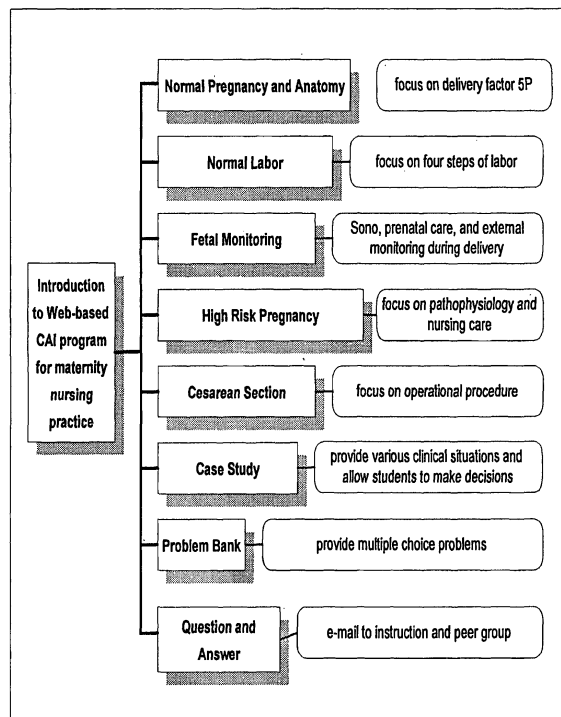

Figure 1 - Menu item for the Web-based CAI program for Maternity Nursing Practice

Step 3: As soon as clinical practice for maternity nursing was over, both experimental and control groups took post-treatment exam on only the contents dealt with in the Web-based CAI program to evaluate learning achievement. Open ended questions as a course evaluation test were given to evaluate knowledge of maternity nursing practice in general. Questionnaires on attitude toward their course experiences and computer/Internet were also given. Additionally, the experimental group was asked to complete a users' feedback questionnaire.

In this study, independent variables were computer and Internet experience, 3 year GPA and test score for maternity nursing, time spent for studying each day, and group. And dependent variables were post-test score, course evaluation score, attitude score toward students' learning experience and attitude score toward computer/Internet. Two tailed t-tests and Wilcoxon Rank Sum tests were used to test homogeneity of the two groups before treatment and difference between the groups after treatment. To test homogeneity, students' GPA, test scores for maternity nursing and computer/Internet experience were compared. To test differences between the two groups after treatment, post-test score, course evaluation score, attitude score on learning experience and attitude score

on computer/Internet were compared. Feedback from the experimental group regarding Web-based CAI program was tabulated using a frequency table.

Results

Data were collected from 14 students in the experimental group and 16 students in the control group. Six students were withdrawn from the study due to their failure to complete different questionnaires. Homogeneity of the two groups was tested. There were no differences between the two groups in three year GPA, computer and Internet experiences, and study hours per day (Table 1).

Table 1 - Comparison of three year GPA, Computer/ Internet experience, and study hours between the two groups

variables		Three year GPA	Comp/Int Experience	StudyHour (min/day)
Exp	Mean	203.86	14.64	630.00
Group	SD	28.52	2.79	520.24
Cont	Mean	203.44	12.94	501.25
Group	SD	16.19	4.17	270.82
t-value		1.18	1.69	0.12
p-value		p>.05	p>.05	p>.05

There was no significant difference in post-test between the two groups. In the post-test, only those materials dealt with in the Web-based CIA program were covered. But there was statistically significant difference in the course evaluation test which covers all materials dealt with in the maternity nursing practice course. The experimental group had higher test scores than the control group (Table 2).

Table 2 - Comparison of the post-test score and course evaluation test score between the two groups

variables		Post-test Score	Course Evaluation Score
Exp.	Mean	7.57	88.93
Group	SD	1.28	8.36
Control	Mean	7.75	80.94
Group	SD	2.08	11.29
t-value		0.29	2.18
p-value		p>.05	p<.05

There was significant difference in the attitude score toward learning experience between the two groups. The experimental group had higher attitude score than the control group. Also, difference in attitude toward computer and Internet was statistically significant. The experimental group had a higher attitude score, indicating a more positive attitude (Table 3).

Students' feedback about the Web-based CAI program was collected from 14 subjects in the experimental group using structured questions. When students were asked how easy it is to use the Web-based CAI program, 64.2% stated that it is very easy to use and none expressed any difficulties in using it.

When students were asked about their perceptions of the two

Table 3 - Comparison of the attitude toward learning experience and Computer/Internet

variables		Attitude toward Learning Experience	Attitude toward Comp/Internet
Exp.	Mean	46.71	17.00
Group	SD	4.87	2.16
Control	Mean	40.63	14.69
Group	SD	6.03	3.68
t-value		-3.01	-1.20
p-value		p<.05	p<.10

teaching methods, 57.14% responded that there was no difference between the two methods and 28.57% stated that the Web-based CAI is more interesting than the traditional small group conference. Students stated that the traditional teaching method provides them with instructor's clinical experience and interactions with instructor, whereas Web-based CAI provides students with opportunities to review study contents with images, graphics, tables, and photos and allow students to work through study materials at their own time.

In terms of helping students to understand course materials, 50% ranked Web-based CAI higher than the traditional teaching method, 14.29% preferred the traditional teaching method, and 39.79% ranked them equally. When students were asked when the Web-based CAI was most helpful, 78.6% stated that the Web-based CAI was helpful before and after the traditional teaching as an aid to prepare and review the learning material and 21.4% stated that the Web-based CAI can replace the traditional teaching.

When students were asked about their opinion on user interface design of the Web-based CAI programs, the majority of students (92.31%) responded that they were very satisfied with the user interface design.

When the students were asked about their learning experience via Internet, 72.42% thought that Web-based CAI was very interesting and 28.57% thought that it was plain.

When students were asked if the Web-based CAI program was helpful in understanding maternity nursing, 77.57% said that it was very helpful. Especially they liked the explanation of nursing vocabulary and the possibility of repeatedly studying contents which they had never been exposed to at clinical practice. Among all the menu items, they used case study and problem bank of problem-based learning more than other menu items of lecture notes.

When the students were asked how they prepare course evaluation test, the majority (90%) stated that they prepare for the examination using printed materials given by the instructor during small group conference and with information from previous examinations. Finally when the students were asked to state possible areas for applying the Web-based CAI programs, adult health nursing was ranked first, followed by community health nursing, pediatric nursing, anatomy, and fundamentals of nursing. Reasons for this ranking included difficulty of understand-

ing instructor's explanation and content materials, large amount of materials covered in the course, lack of reference materials and lack of class time.

Discussion

Participants in our study have similar backgrounds in terms of their ability and demography. Even though study subjects were not assigned into two groups randomly, the two groups were homogenous in those variables that might have an effect on the dependent variables of our study such as 3-year GPA, computer and Internet experience, and number of study hours per day. These were the variables that had significant effect on the education in Thede, Taft and Coellings study [4].

Results of the study showed that there was no significant difference in the post-test given by the research team, but there was a significant difference in the course evaluation test given by the course instructor. That is, the experimental group had a higher average evaluation score than the control group. This could be due to the fact that students did not pay much attention to the test given by the research team but they prepared for the course evaluation test using information from previous exams. Web-based CAI helped those who were in the experimental group to prepare their exam.

Findings on the attitude scores toward learning experience showed that there was significant difference between experimental and control groups. Also, there was significant difference in attitude toward computer and Internet between experimental and control groups. This has a positive implication to nursing education in that instructional method improves students' attitude and this in turn improves students' motivation.

Students' feedback regarding the Web-based CAI program as a learning tool was very positive. This is due to the easy user interface such as presenting multimedia learning material and hyperlinking learning sources provided by the Web browser .

From this study we identified areas in need of improvement for a Web-based CAI program to be used in nursing education, for example, preparing students and faculty members to use information technology. We also found subject areas requiring various multimedia educational materials is a good candidate for a Web-based CAI. More research with a larger number of study subjects and a longer study period are needed. And we also need to find ways to optimize educational effects by utilizing the information technology. .

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