J Community Nutrition 3(1) : 36~39, 2001

Computer Assisted Instruction(CAI) in Nutrition Education for Junior High School Students

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ABSTRACT

We developed a junior high school-level computer assisted instruction(CAI) lesson on obesity and weight control and compared its effectiveness with the lecture/discussion method. We collected pretest and posttest data on knowledge and interest in obesity and weight control from 450 students in junior high school. We randomly assigned three groups : the CAI lesson group, a comparable lecture/discussion lesson group and control group. There were significant differences among these three groups in posttest knowledge scores, and in interest in weight control. CAI students' responses to learning by computer were significantly positive. (*J Community Nutrition* 3(1) : 36~39, 2001)

KEY WORDS : computer assisted instruction(CAI) · nutrition education.

Introduction

The evolution of computers provides an additional medium for educators to explore as a teaching and learning tool. According to several studies, the computer is accepted as an instructional medium that may stimulate interest and motivation. The increasing accessibility of computers in hospitals as well as in schools makes it feasible to use computer-assisted instruction(CAI) regarding nutrition for both patients and students. CAI improves both the effectiveness and the efficiency of instruction by allowing learners to progress at their own rates, enabling contents to be adapted to meet the needs of each learner, and providing immediate feedback. One important advantage of CAI over other instructional media is that the student can be actively involved in learning through appropriate interactive exercises. The increased availability of computers and nutrition-related software has stimulated interest in the use of CAI in nutrition education(Shannon 1984). Recent literature reports on computer application in nutrition education include the use of CAI for college level nutrition education(Carew et al. 1984) and for the general public in shopping malls, as well as the use of computerized dietary analysis in various educational settings(Duford et al. 1984, Murphy et al. 1984, Slavin et al. 1984). Most of these reports are descriptions of specific experiences and viewpoints of educators involved. Research in many subject matter areas(Conklin 1983) has shown that CAI can be effective : however, thus far there has been little research on the effectiveness of CAI in nutrition in Korea.

The objective of this study was to determine whether CAI was a feasible to the lecture/discussion method for teaching food and nutrition topics at the junior high school level.

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Subjects and Methods

1. Subjects

The subjects of this study were 450 junior high school students in second grade who were attending Kye-Sung Junior High School in Taegu. Fifty-five percents of the students were female and forty-five percent were male. Their mean age were 15±3 years old.

2. Study design

The students participated in this study to compare the effectiveness of the CAI and the lecture/discussion method in teaching food and nutrition. We randomly assigned each class as either CAI treatment(150 students), lecture/discussion treatment(150 students) or control group(150 students). This research design allowed for comparison of the two instruction methods with each other and with the control group. In the CAI group, we instructed students for five hours by computer assisted instruction, which was composed of power point slides, and a CD-Rom. The total slide number of the power-point presentation were 95, the contents of the slides were major concepts of nutrients and ideal body weight and obesity. In particular, the slide contents were made up of interesting figures and updated materials. We developed pre- and posttest questionnaires for each group. Since the major objective of many lessons in classes is to increase students' knowledge of the subjects, we choose knowledge of obesity and weight control as our primary criterion for evaluating lesson effectiveness. However, factors such as interest in subject matter can also influence knowledge gains. Therefore, we assessed both knowledge and interest in obesity.

We developed a multiple-choice test to assess knowledge of obesity and weight control. Nutrition professionals reviewed the test, and we revised test items accordingly. A panel of these professionals verified the content validity of the final 50 item test. The Cronbach alpha reliability coefficient reflecting internal consistency was 0.65 for pretest scores. The test-retest reliability coefficient for the 150 students in the control group was 0.75. To assess interest in the topic of weight control, we asked students to provide one of three responses(slightly interested, moderately interested, or strongly interested) to the question "How much are you interested in obesity and weight control?"

To determine how the students liked the CAI lesson, we asked students to describe their experiences with the lesson using three, four-point semantic differential items : satisfying-frustrating, motivating-nonmotivating, and interesting-boring. We then calculated mean scores for each of these items.

3. Data collection and analysis

We conducted the study over a six-week period. All three groups completed the pretest questionnaire during one regularly scheduled class period. One week later, we presented their respective obesity and weight control lessons to CAI and lecture/discussion groups. The control group received a lesson on another topic. Four weeks after the lesson presentation, all three groups completed the posttest questionnaires.

In tabulating and analysing the data, we used SPSS program. Analysis of variance was used to determine whether the differences existed among the three groups with regard to knowledge and interest. We also used analysis of variance to determine differences between pre- and posttest knowledge and interest in obesity and weight control for each group.

Results

Ninety-five percent of the students completed both pre- and posttest questionnaires. Fifty-five percents of the students were female and forty-five percent were male.

We used their "knowledge score" which is the total numbers of correct responses on the knowledge test, as our primary criteria for judging effectiveness of the instruction methods. Table 1 presents the mean scores of pretest and posttest for students in all three groups. Mean scores in pretest on the 50-item knowledge test (six major nutritents and their functions, ideal body weight and obesity) were lower than we anticipated, indicating that these students had a little knowledge before the formal instruction. Since there were no significant differences in pretest scores among the three groups, we assumed that the groups were similar in their knowledge.

There were significant differences between pre- and

Table 1. Mean knowledge scores of CAI, lecture/discussion, and control groups

Group	n	Pretest[1]	Posttest
CAI	142	25.7±6.5[2]	40.5±5.5**
Lecture/Discussion	142	24.3±7.1	39.8±6.5**
Control	143	26.7±6.3	28.7±4.6

** : $p<0.01$

1) Maximum score of both the pre- and posttest=50

2) mean±SD

postscores of the CAI and lecture/discussion groups. However, there were no significant differences between the postscores of the CAI and those of the lecture/discussion group. The postscores of the CAI group was similar with those of the lecture/discussion group. Thus, our results suggest that CAI method was as effective as the lecture/discussion method.

Because interest in a study topic can ultimately affect knowledge, we also assessed the impact of both instructional methods on interest by comparing pre- and posttest responses to the question "How interested in obesty and weight control are you?" On the pretest, most of the students(61%) were strongly interested in obesity and weight control, more than a third(34%) were moderately interested, and the rest(5%) were only slightly interested in this topic.

Mean interest scores on pre- and posttest(Table 2) indicated that the CAI method was significantly effective at increasing interest in this topic.

During the CAI lesson, we observed that the students were attentive and seemed genuinely interested in the lesson.

Table 3 presents mean ratings for the semantic differential items that CAI students used to describe their experiences with the lesson. The students responded positively toward the lesson. Their responses indicated that their experiences with the CAI lesson were fairly satisfying, motivating, and interesting.

Table 2. Mean interest scores[1] in CAI, lecture/discussion, and control groups

Group	n	Pretest	Posttest
CAI	142	1.8[2]±.90	2.8±.73*
Lecture/Discussion	142	1.7 ±.89	1.8±.83
Control	143	1.6 ±.51	1.3±.48

1) Responses to question "How interested in obesity and weight control are you ?" with 1=slightly interested, 2=moderately interested, and 3=strongly interested
2) mean±S.D
* : $p<0.05$

Table 3. Mean scores in the rating scale on the CAI lesson

Item	Mean[1]±SD (n=150)
Satisfying-Frustrating	3.7±0.45
Motivating-Nonmotivating	3.6±0.48
Interesting-Boring	3.5±0.78

1) For each item the most positive response was 4, and the least positive was 1

Discussion

By adopting computers in nutrition education, we provide the opportunity for better use of professional and client time. Nutrition educators could become more effective by using computers for interviewing, assessment, determining dietary prescription, and counseling. Freeing educators from repetitious instruction and clerical tasks would leave more time for personalized instruction and counseling. Similarly, using a computerized nutrition education program could be a productive use of time. The decreasing cost of computers and the increasing cost of professional' time makes computers practical today and likely to become even more practical in the future. In addition, computers provide users with immediate application of facts and feedback that may enhance learning. Information can be standardized and free from biases such as facial expression and tone of voice. Abstract information may be simplified through visual analogies, and use of computers can be as effective as or superior to traditional instructional methods. The computer user becomes an active participant, rather than a passive observer, and this creates a positive learning environment.

Due to the specificity of subject matter included in this study, results of this study should be interpreted cautiously. They do, however, support previous research in suggesting that CAI is a feasible alternative to the lecture/discussion method in the junior high school nutrition classroom.

There were significant effects on learning with CAI method or lecture/discussion method. Postscores on the knowledge test of the CAI group were not significantly higher than those of the lecture/discussion group. These findings are consistent with those of previous researchers. Schroeder and co-workers(1983) compared CAI with the lecture method. They found that CAI was as effective as traditional classroom instruction. In addition, in recent research(Yoon et al. 1993), compared the learning effects of CAI and traditional instruction methods in the Home Economics class of a middle school to examine the difference of learning effect between a CAI group and a traditional instruction group according to ability level. They also found that the CAI group showed significantly higher scores on academic achievement than those of the traditional instruction group.

This study has indicated that students like learning nutrition via CAI. Carew and co-workers(1984) also reported positive student response to the use of CAI in nutrition education. Their preliminary evaluation of a CAI program indicated that most students found the CAI approach useful and felt that it saved time and improved grades. Well-designed CAI tutorials can free class time for discussion of current nutrition issues, and can also be used by students to review during a course in sequence. For these purposes CAI has advantages over printed materials because it is interactive, can be highly individualized and is less costly to revise and update.

Since few CAI programs in nutrition are currently available, instructors may need to develop their own programs, and the initial time costs of CAI can be very high. The time needed to develop a high quality CAI program varies with a number of factors including the experience of the author, the complexity of the lesson, and whether the lesson makes use of existing CAI teaching strategies or generates new ones. Fortunately, the time needed to produce CAI lessons generally decreases dramatically with authoring experience.

Conclusion

Considerable use is being made of computerized dietary analysis in both formal and informal educational settings. Computers are also providing significant assistance with administrative tasks related to nutrition education. Comprehensive use of computers to assist with nutrition instruction is less widespread, but indications are that within the next decade, there will be enormous growth in the development of computerized instruction(CAI) for nutrition.

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