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Introducing a Computer Aided Instruction into Nutrition Course: Student Evaluation

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Abstract: Computer aided instruction (CAI) has gained reputation in a lot of disciplines. The aim of the research was to folds: student evaluation of the implementation of a CAI and perceptions of the value of CAI in learning nutrition. A prototype CAI nutrition program was developed to provide principles of nutrition. Descriptive, Kruskal Wallis test and Spearman correlations were conducted to explore the relationship among study variables. 399 students were included in the analyses. The vast majority of students reacted positively to CAI. There was significant difference between gender on preference, image quality, learning, and the motivation. There is a significant difference between gender on protein, energy, and health knowledge subjects. Students' responses to CAI were very high. Based on the results of this research, nutrition educators can recommend that nutrition CAI programs be implemented in university students.

Key words: Computer aided instruction, nutrition course, nutrition education

Introduction

In recent years, computer aided instruction (CAI), as an educational tool, has gained considerable popularity in many disciplines (Isman *et al*., 2004; Usun, 2004). Faculties and institutions have introduced CAI into their teaching/learning programmes because educators have recognized the need to provide students with computer literacy skills that enable them to access and process the wealth of information on the internet (Shotsberger, 1996). In CAI research, interaction between individuals and the computer has been humanized in accordance with Vygotsky's (1978) belief that learning is a direct result of social interaction. As computer is part of the social environment, students' affective and cognitive reactions to the computer software programs have been described (Cordell, 1991; Anderson *et al*., 1993). Nutrition is known to be one of the key factors influencing health. Nutritional deficiencies (protein-energy malnutrition, iron, vitamin A, and iron deficiency) and health problems such as helminth infections (infections with roundworm and other intestinal parasites) and malaria affect school participation and learning. Studies on the relationship nutritional anthropometric indicators (i.e. height for age and weight for height) and school indicators (i.e. age at enrolment, absenteeism, achievement test scores, IQ, and performance on selected cognitive tasks) showed that better nutritional status was consistently linked to higher cognitive test scores or better school performance (Pollitt, 1990).

Trained teachers delivering nutrition education produce more significant outcomes in student health knowledge and skills than untrained ones (Vince-Whitman and Aldinger, 2001). A fundamental skill for the teacher is to change children's knowledge structure of basic nutrition concepts and to increase children's critical thinking skills related to nutrition concepts. Education faculties in Turkey undertake a 4-year BA and BSc degree course or a post graduate programme each consisting of both academic and practical components. The primary objectives of the of the training, supervised by teaching staff and regulated nationally by the Ministry of Education, are to enable students to acquire practical skills and to translate theoretical knowledge into effective educational practice. Many students have found the transition from the academic environment of a university to the teaching environment of a school difficult. Nutrition course is compulsory to preschool teacher education department by the Ministry of Education. Only in Selcuk University Biology and Class Teacher Education departments in Turkey have nutrition course unlike many countries in EEC (Dixey *et al*., 1998).

Students have indicated the gap between theory and practice. It was for this practical reason that the researcher introduced CAI as part of the formal instruction of nutrition course in 2002. While restructuring of the teaching programme was largely one of the necessity, it was recognized the need for more flexible and alternative methods of instruction and learning. The introduction of a new course or programme necessitates evaluation. This study examines student evaluation of the implementation of a CAI and perceptions of the value of CAI in learning nutrition.

The paper was presented at the V. International Educational Technology Conference, Sakarya, Turkey

Table 1: Students' evaluations of CAI (% students)

Items	Often/usually effective		Rarely/sometimes effective		Chi-Square	P value
	Male	Female	Male	Female		
The presentation	97.9	95.3	2.1	4.7	3.423	0.064
The content	95.7	97.7	4.3	2.3	1.616	0.204
Preference of CAI to other forms of learning	93.6	93.0	6.4	7.0	8.704	0.003**
The image quality	97.9	98.8	2.1	1.2	8.231	0.004**
Novelty	93.6	96.5	6.4	3.5	24.721	0.000**
Understandability	97.9	97.7	2.1	2.3	3.122	0.077
Learning	91.5	94.2	8.5	5.8	11.007	0.001**
The motivation	89.4	94.2	10.6	5.8	27.173	0.000**
Interactive components	95.7	96.5	4.3	3.5	10.432	0.001****

$p \leq 0.01$, Kruskal Wallis test

Table 2: Students' perceptions of the value of CAI in learning nutrition (% students)

Items	The Most beneficial		Least beneficial		Chi-Square	P value
	Male	Female	Male	Female		
Carbohydrates	87.2	90.7	12.8	9.3	1.090	0.296
Proteins	87.2	94.2	12.8	5.8	5.419	0.020**
Fats	89.4	91.9	10.6	8.1	0.732	0.392
Water	76.6	84.9	23.4	15.1	3.092	0.079
Energy	78.7	90.7	21.3	9.3	11.084	0.001**
Vitamins	89.5	89.6	10.5	10.4	0.000	1.000
Minerals	89.4	83.7	10.6	16.3	2.628	0.105
Health knowledge	80.9	95.3	19.1	4.7	20.525	0.000**

** $p \leq 0.01$, Kruskal Wallis test

Materials and Methods

A prototype CAI program, nutrition course was developed to provide principles of nutrition. This hypertext program includes several types of interactive learning exercises, text, animation, food pictures, and on-line quizzes. All students completed the course between September, 2004 and January, 2005. The 10 week course includes formal didactic experiences (lectures, discussions, and CAI program). Nutrition course was the only CAI program employed during the term. Prior to this experience students had been exposed to computer usage course during their first and second years of education faculty. Nevertheless, CAI was not used extensively and was seen primarily as a supplement to more traditional forms of instruction. The study was approved by the Ethics Committee at Selcuk University. Informed consent was obtained from each student.

All fourth year biology teacher education, third year class teacher education, and first year preschool teacher education candidates took part in the study as it was integrated as part of their undergraduate degree program at University of Selcuk, Konya, Turkey.

After completing the course, students were asked to respond a 19-item survey designed to assess their evaluation of the CAI educational program. The instrument employed a 4-point scale (where 1 = very effective and 4 = not effective at all).

Following a pilot testing on 30 students and revision, the survey consisted of:

1. Demographic questions that included age and gender,
2. Student evaluation of CAI (9 items)
3. Student evaluation of the program components (8 items)

The Statistical Package for the Social Science (SPSS, version 13.0) was used in analyzing data. Descriptive were calculated for all variables. Kruskal Wallis test and Spearman correlations were conducted to explore the relationship among study variables. The level of significance selected for use was $p = 0.05$. Cronbach' alpha values were determined to asses the inter-item reliability of the final scores.

Results

Three hundred and ninety nine students were included in the analyses. Mean age of the students were 21 years, and varied between 19 and 25 years (21.20±1.14). 64.7% girls, and 35.3% boys and none of them were married, and had children. No significant effect of age was observed.

An examination of the CAI component of the survey (Table 1) shows an interesting pattern of responses to the individual items. As can be seen, the vast majority of students reacted favourably to CAI. This might be because of a computer skills course they had taken in the first year and utilized CAI packages. There was significant difference between gender on preference,

Table 3: Summary statistics of messages

Scale	Mean Score	SD	Coefficient alpha	Skewness	Spearman correlation
CAI	17.00	4.88	0.82	1.53	-0.22
Program components	9.50	3.14	0.87	2.77	-0.07

image quality, learning, and the motivation (P<0.01). Other than effectiveness of the presentation, preference of CAI to other forms of learning, and understand ability of CAI; female respondents scored higher than males.

In Table 2 students' evaluation of the components of the nutrition course is given. Clearly, students perceived *Proteins* to be of greater educational benefit. Females scored higher than males. There is a significant difference between gender on protein, energy, and health knowledge subjects. Only 23% of male students, however, CAI was rarely/sometimes effective at water subject in the course.

The final CAI and program components demonstrated good internal consistency. Both of them had internal consistency of 0.82 and 0.87 respectively. The summary statistics of the research is given in Table 3.

Discussion

Mainly for practical reasons, CAI was introduced for the first time. Clearly, for a high proportion of the students, CAI better suited to their approach to learning nutrition. The learning styles or strategies a student employs depend on the subject material and perceived educational benefits gained from accessing particular resources. In providing access to a wide range of resource material, education faculty students at The University of Selcuk are given the flexibility to tailor their needs based on their perceived learning requirements, and educators will confirm the merits of such freedom.

Students' evaluations and perceptions in their learning and understanding provide feedback for educators. Kutnick (Kutnick, 1997) reported gender differences in middle school children responses to CAI simulations. The researcher concluded that the girls spent more time talking about the task and the boys spent more time using the computer. In this study, male students' evaluations of CAI score were higher than female students'; conversely female students' perceptions of the value of CAI in learning nutrition score were higher than male students'.

From personal experience of many years of teaching nutrition and from student comments, The CAI developed was enjoyable, fun, interactive and stimulating. It is also worth remember that the design of the CAI be in line with the overall structure of the course (Janssen *et al.*, 1996). If CAI is to be an integral part of the curriculum, it is essential that students are computer literate and at similar levels in order for them to derive maximum benefit from this source (McLean, 2000). At the University of Selcuk, students are from diverse cultural, socio-economic and educational backgrounds. For those students, their first exposure to computers would be computing skills course and CAI offered in the *Nutrition* course. The more financially secure students have a higher level of computer literacy. Chadwick (1997) indicated that computer confidence is important in the degree of utilization of this by students, and deficient computer skills disadvantage students, severely impeding independent learning. While students may want computers as part of their education, this depends on applicability, the level of faculty endorsement, the training provided and ongoing support offered to staff and students (McLean, 2000).

The students were from the same faculty. First, a larger and larger numbers might provide a more stringent test to CAI in nutrition curriculum. Second, comparison between the effectiveness of CAI and other forms of teaching must take place, and positive and negative features of CAI must be highlighted. In particular, attitudes toward learning nutrition, and change in nutrition related outcomes should be investigated. Third, the results reported here are based on a prototype. Therefore, different type of CAI programme could yield different results.

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