THE EDUCATIONAL SOFTWARE DESIGN AND EVALUATION FOR K-8: ORAL AND DENTAL HEALTH SOFTWARE

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ABSTRACT

The aim of this study is to inform about the development of the software "Oral and Dental Health" that will supplement the course of Science and Technology for K8 students in the primary school curriculum and to carry out an evaluation study of the software. This software has been prepared for educational purposes. In relation to the evaluation of the software, "Educational Software Evaluation Form" was developed by the researchers. Expert evaluation was carried out by 9 computer teachers and 12 teachers of science&technology teaching in primary schools. As a result of the evaluation process, the educational software was found to be satisfactory by the computer teachers and the science&technology teachers. It was also revealed that the computer teachers and science&technology teachers differed in their opinions about the evaluation criteria. Moreover, it was considered necessary to revise and edit the evaluation criteria found in the educational software in line with the opinions of the computer teachers.

Keywords: Educational software, software development, educational software evaluation.

INTRODUCTION

With the help of health education, health-related information and habits are conveyed to families and to the society. Such factors as the learning capacity of primary school students, the transfer of what is learnt at school to the family members and as the thought of the society that the most accurate information can be given in schools all strengthen the belief that the contributions of children are likely to be more effective (Pekcan, 1997).

There are no courses called "health education" in the curriculum of K-8 schools of the Ministry of National Education (MNE) in Turkey. Health-related subjects are included in certain units of courses such as Social Life and Science and Technology. Health education in primary school level in Turkey is given in the subject of "Oral and Dental Health", as a four-hour lesson under the heading of "Digestion of Foods" in the unit of "Let's Solve Our Body Puzzle" in the 5th grade course of Science and Technology. The goals of the unit, in relation to oral and dental health are (MNE, 2006):

1. to understand the importance oral and dental health,
2. to be attentive to oral and dental health.

The subject of oral and dental health can be said to have limited content and limited course hour in the curriculum of primary schools. There is a close relationship between education and oral and dental health, and the subject related to this should be supplemented with educational activities. Although there are certain educational activities related to oral and dental health executed by some institutions and associations in our country, there are not any common systematic and constant educational programs. Children at pre-school and primary school ages are those who should be considered in the first place in terms of oral and dental health (TDB, 2006). Depending on this, in order to support the primary school curriculum, educational software to be prepared for oral and dental health can be used as supplementary materials that help to motivate primary school students and to increase their awareness of the importance of oral and dental health and that help them to work according to their own learning pace without being dependent on time and place. A majority of the educational software in our country aim at supplementing the lessons and subjects in the primary school curriculum. The primary school curriculum has a narrow scope and content in terms of health education. Therefore, educational software to be prepared in the area of health education are quite important for individual and social health. These software are also of great significance in terms of consciousness-raising in health at an early age.

METHOD

The aim of this study is to inform about the development of the software "Oral and Dental Health" that will supplement the course of Science and Technology for K8 students in the primary school curriculum and to carry out an evaluation study of the software. The further aim of this study is to primarily present the development stages in line with the opinions and suggestions of the subject matter specialists about this instructional software designed and developed by the researchers. The secondary purpose is to present the results related to the evaluations of this educational software by science&technology teachers and by computer teachers.

"Dental And Oral Health" Software For K8

In the scope of the study, an educational software was developed for the purpose of supporting the course of Science and

Technology in the primary school curriculum, raising the consciousness of K8 students about “Oral and Dental Health” and for the purpose of offering a health-related resource that students can refer to. This software was intended to serve as an instructional software with its way of presentation of its content and subjects. Moreover, the educational software aimed at supporting visual learning with videos and animations, which would lead to permanent learning by enabling students to repeat the subjects.

The educational software was developed with Macromedia Flash 8. Besides its practicability in terms of its features such as the preparation of animations, the use of videos and the availability of user interaction with its ActionScript language, the use of the Flash program was considered to be suitable for the development of the software since the sizes of the files used were small.

The goals to be achieved with the help of the educational software were formed in line with the goals of the subject “Oral and Dental Health” found in the 5th grade primary school curriculum. The goals that students are expected to achieve with the help of the software called “Dental Home: Oral and Dental Health” are as follows:

1. Understanding the importance of oral and dental health,
2. Having the information and skills necessary for being in good oral and dental health.

Introduction To The Software And Its Content

The “Intro” page found in the introduction part of the software has been prepared for the purpose of keeping students motivated and interested in the subject. Figure 1 shows the entrance page that follows the “Intro” page of the software. This entrance page includes the goals page that aims at informing students about the goals and content of the software.

Figure 1: The goals page of the software

Following the goals page of the software comes the “Pre-test” page. The pre-test page is seen in Figure 2 below.

Figure 2: The pre-test page of the software

The pre-test found before the introduction of the subjects has been prepared to test the previous knowledge about the subject. After the introduction of the subjects, a post-test made up of the same questions as the pre-test is given for the purpose of testing how much has been learnt. The students are informed about their scores of the tests they have taken. They are also informed about which subjects they are found poor in. To achieve the pre-determined goals, 4 subject headings are included

in the software. These subjects are as follows:

a. Basic Concepts: In this part, the concepts related to the subjects are presented through illustrations. Besides the basic concepts related to the mouth, the teeth and the dental constitution, basic information is given also about the duties of the teeth and their effects on speech.

b. Periodontal Diseases: In this part, following the introduction of the important periodontal diseases, the symptoms, the causes and the ways of prevention and treatment are mentioned.

c. Methods of Tooth-Brushing: This part consists of information about how to brush teeth and how to use dental floss. The information given in this part is illustrated with pictures and videos because it is application-based information.

d. The Protection Ways of Oral and Dental Health: This part gives information about what should be done to take oral and dental care.

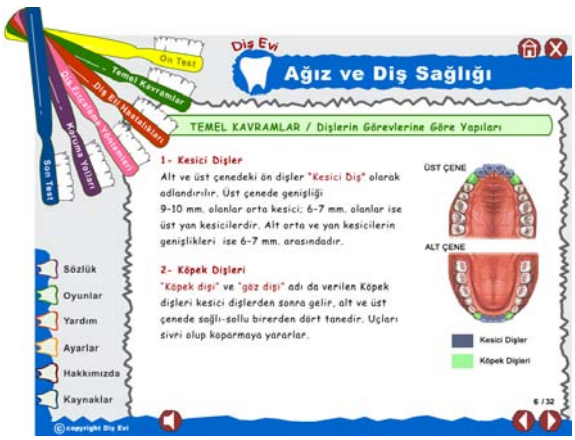
The Processing of the Software

There is a menu and buttons in the software to help students follow the content and use the software. Figure 3 shows the menu and the buttons found in the software.

Picture 3: The menu and the buttons

The next-back buttons, illustrated with the circle number 1 in figure 4, are used to follow the content linearly after the goals page of the software. The menu, illustrated with the circle number 2 in figure 4, can be used to pass through any subject that the student wants to study. With the help of this menu, the student can reach the related content without taking the pre-test. Moreover, the student can study any of the subjects found in this menu by clicking it. With the "turn-on volume" button, illustrated with the circle number 3 in figure 4, the student can hear the related audio-recorded texts.

Figure 4 presents one of the screen pages in which there is instruction on one of the subjects.



Picture 4: Instruction screen

Prior to instruction on subjects, there is a screen page which includes sub-headings found under each of the four main headings. This screen also enables the student to reach the sub-heading he wants to explore under the related main heading.

Supporting Tools of the Software

The supporting tools of the software are made up of “Dictionary”, “Games”, “Help”, “Settings” and “About us”.

In the “Dictionary” part, students can reach detailed definitions of the concepts they face in the software. In the “Games” part, in order to have students interact with the software and to facilitate learning the content, there are 3 games. These games are intended to help students go through the software without getting bored as well as to increase their motivation. In the “Settings” part, there are two alternatives either of which students can choose to change the background color of the software. In the “Help” part of the supporting tools of the software, there are some explanations regarding the use of the software. The “Resources” part provides links to the resources used for the preparation of the content of the software and to the other related resources. As for the “About us” part, it gives brief information about the researchers, who developed the software, and their contact addresses.

Subjects

The population of the study consists of 12 science&technology teachers in K8 and 9 computer teachers in K8.

Data Collection

As a result of reviewing the literate on educational software evaluation, “Educational Software Evaluation Form” was developed by the researchers. In order to determine the content validity and the clarity of the items in this evaluation form, 6 field experts were consulted for their opinions. In line with the opinions of the experts, the evaluation form was finalized. The evaluation form includes a total 40 items such as educational features (19 items), user control (5 items), evaluation and keeping records (5 items), technical features (4 items) and the design features (5 items). For the purpose of determining the views stated about the criteria via the evaluation form, the responses were handled according to the 5-point Likert scale as “very good”, “good”, “average”, “poor” and “very poor.” As a result of the analysis, the reliability coefficient of .95 was found for the evaluation form.

ANALYSIS & FINDINGS

For the analysis of the data obtained with the help of the educational software evaluation form, descriptive statistics, one-sample *t*-test and independent-samples t-test were applied. The findings revealed by the data analyses are presented below under the headings of general evaluation of the software, educational features, user control, evaluation and keeping record, technical features and the design features.

Findings Related To The General Evaluation Of The Educational Software

In order to determine the evaluations of the computer teachers and of the science&technology teachers about the educational software’s features that fall into 5 categories, one-sample *t*-test was run, and the group means of each category were compared with 3 which is a neutral value (Table 1 and Table 2).

Table 1: One-Sample *t*-test Results of The Opinions of Computer Teachers about the Features of the Educational Software

	Computer Teachers N=9				
Criteria	$\overline{X}$	Sd.	t	df	sig.
Educational Features	3.92	.66	4.24	8	**.003**
User Control	4.04	.80	3.92	8	**.004**
Evaluation and Keeping Record	3.60	.55	3.29	8	**.011**
Technical Features	4.58	.40	12.02	8	**.000**
Design Features	3.92	.79	3.51	8	**.008**

According to the values in Table 1, it was found in relation to the features of the educational software that the means of computer teachers’ opinions about technical features, educational features, user control, design features, and evaluation and

keeping record in turn were significantly higher than the value of 3 which was considered neutral. Depending on this finding, the computer teachers were found to have positive opinions about the features determined for the evaluation of the software.

Table 2: One-Sample *t*-test Results of The Opinions of Science & Technology Teachers about the Features of the Educational Software

	Science.&Technology Teachers N=12				
Criteria	$\overline{X}$	Sd.	t	df	sig.
Educational Features	4.68	.27	21.05	11	**.000**
User Control	4.95	.12	54.34	11	**.000**
Evaluation and Keeping Record	4.77	.27	22.89	11	**.000**
Technical Features	4.90	.13	51.02	11	**.000**
Design Features	4.82	.19	32.55	11	**.000**

According to the values in Table 2, it was found in relation to the features of the educational software that the means of science&technology teachers opinions about educational features, user control, evaluation and keeping record, technical features and design features in turn were significantly higher than the value of 3 which was considered neutral. Depending on this finding, the science&technology teachers were found to have positive opinions about all the features determined for the evaluation of the software.

Table 3 below presents the results of the independent sample *t*-test which was applied to reveal the difference between the opinions of the computer teachers and those of the science&technology teachers about the educational software.

Table 3: Independent-samples t-test Comparing Computer Teachers and Science&Technology Teachers in terms of Sub-Sections of the Measurement Tool

Criteria		N	$\overline{X}$	Sd.	t	df	sig.
Educational Features	Computer Teachers	9	3.93	0.66	-3.57	19	**0.002**
	Science. & Technology Teachers	12	4.67	0.28			
User Control	Computer Teachers	9	4.04	0.80	-3.90	19	**0.001**
	Science. & Technology Teachers	12	4.95	0.12			

…continue from Table 3

Criteria		N	$\overline{X}$	Sd.	t	df	sig.
Evaluation and Keeping Record	Computer Teachers	9	3.60	0.55	-6.46	19	**0.000**
	Science. & Technology Teachers	12	4.77	0.27			
Technical Features	Computer Teachers	9	4.58	0.40	-2.58	19	**0.018**
	Science .& Technology Teachers	12	4.90	0.13			
Design Features	Computer Teachers	9	3.92	0.79	-3.85	19	**0.001**
	Science. & Technology Teachers	12	4.82	0.19			

As can be seen in Table 3, it was found that there was a significant difference between the computer teachers and the science&technology teachers for each of the features of the educational software. The opinions of the computer teachers about the features of the software were different from those of the science&technology teachers. However, it could be said that the opinions of the science&technology teachers about the features of the software were more positive than those of the computer teachers.

Findings Related to the Features of the Educational Software

Table 4 and Table 5 below present the results of the opinions of the computer teachers and of the science&technology teachers about the features of the educational software.

Table 4: The Opinions of Computer Teachers about the Features of the Educational Software

	Sci.&Tech. Teachers0 (N=12)				
Educational Features	$\overline{X}$	Sd.	t	df	sig.
Accuracy and currency of content	4.92	.29	23.00	11	.000
Gradual presentation of content	4.92	.29	23.00	11	.000
User Control	$\overline{X}$	Sd.	t	df	sig.
Appropriateness of the instructions to the target population	4.92	.29	23.00	11	.000
Evaluation and Keeping record	$\overline{X}$	Sd.	t	df	sig.
Appropriateness of evaluation to the target population	4.92	.29	23.00	11	.000
Appropriateness of evaluation to the content	4.92	.29	23.00	11	.000

…continue from Table 4

Technical Features	$\overline{X}$	Sd.	T	df	sig.
Providing sufficient amount of waiting-time to reach information in the software	4.58	.51	10.65	11	.000
Design Features	$\overline{X}$	Sd.	t	df	sig.
Effective Use of the screen	4.92	.29	23.00	11	.000
The relevancy of visual elements to real-life	4.92	.29	23.00	11	.000

As can be seen in Table 4, it was found that the computer teachers had positive opinions at most about “the software’s supplementing the education” and “objective content” among the educational features of the software, “the appropriateness of the use of the software to the target population” among the features of user control, “the appropriateness of evaluation to the goals” among the features of evaluation and keeping record, “easy installation” among the technical features and “color” among the design features. However, it was revealed that computer teachers reported negative opinions about “providing different opportunities” and “the effectiveness of the testing materials” among the educational features of the software. Depending on this, it was concluded that the computer teachers held the belief that the educational software was not effective in terms of testing materials and of its supplementing different learning opportunities.

Table 5: The Opinions of Science&Technology Teachers about the Features of the Educational Software

	Comp. Teachers (N=9)				
Educational Features	$\overline{X}$	Sd.	t	df	sig.
The software’s supplementing the education	4.33	.71	5.66	8	**.000**
Objective content	4.33	.71	5.66	8	**.000**
Providing different learning	3.33	1.00	1.00	8	.347

opportunities

User Control	$\overline{X}$	Sd.	t	df	sig.
The appropriateness of the use of the software to the target population	4.00	.50	6.00	8	**.000**

…continue from Table 5

Evaluation and Keeping Record	$\overline{X}$	Sd.	t	df	sig.
Appropriateness of evaluation to the goals	3.89	.60	4.44	8	**.002**
The effectiveness of the testing materials	3.11	.78	.43	8	.681
Technical Features	$\overline{X}$	Sd.	t	df	sig.
Easy installation	4.78	.44	12.10	8	**.000**
Design Features	$\overline{X}$	Sd.	t	df	sig.
Color	4.22	.83	4.40	8	**.002**

As can be seen in Table 5, it was found that the science&technology teachers had positive opinions at most about "accuracy and currency of content" and "gradual presentation of content" among the educational features of the software, "appropriateness of the instructions to the target population" among the features of user control, "the appropriateness of evaluation to the target population" and "appropriateness of evaluation to the content" among the features of evaluation and keeping record, "providing sufficient amount of waiting-time to reach information in the software" among the technical features and "effective use of the screen" and "the relevancy of visual elements to real-life" among the design features. It was also revealed that the science&technology teachers did not report any negative opinions about any of the features of the software.

CONCLUSIONS

In line with the findings obtained through the expert-evaluation of the educational software, "Oral and Dental Health" designed as a supplementary material for health education found in the syllabus of Science and Technology Course in primary schools, it was concluded that the educational software should be revised and improved. According to the results, the computer teachers and the science&technology teachers reported positive opinions about the software.

Moreover, the difference between the opinions of the science&technology teachers and those of the computer teachers about the evaluation of the educational software made it possible to evaluate the software both technically and pedagogically. The computer teachers, who participated in the evaluation process of the educational software, reported opinions more about the technical features due to their also being field-experts, whereas the science&technology teachers reported opinions about the educational content and features. Depending on this, it could be concluded that the software was rich in content and the subject area covered, yet it was not so strong in terms of its technical features.

As a result of the evaluation, in line with the opinions of the computer teachers, it was concluded that the testing materials found in the educational software should be revised and re-organized. Following the changes to be made in the software according to the findings of the present study, the revised version of the software could be suggested for use in primary schools as a supplementary material. However, this software will bear more effective results if used in line with the revisions to be made after the evaluations in terms of the target population. Therefore, it is considered necessary to carry out an evaluation study based on the opinions of primary school students about the educational software of "Oral and Dental Health." Following the revisions and changes to be made in line with the findings that will be obtained from a pilot study and from evaluation studies, this educational software will be suggested for use as a supplementary material in primary schools.

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