2nd Cyprus International Conference on Educational Research, (CY-ICER 2013)

The Research Proposal of Developing and Testing an Adaptive Learning System in Order to Increase the Primary School Students' Awareness Regarding Teeth Health and to Reduce Their Dental Anxiety

Özlem Çakır[a] *, Emine Çelik[b], Mehmet Barış Horzum[c]

[a]Ankara University, Faculty of Educational Science, Department of Computer Education and Instructional Technology, Ankara and 06500, Turkey
[b]Dentist, Meşrutiyet Caddesi 41/7 Kızılay/Ankara, Turkey
[c] Sakarya University, Educational Faculty, Department of Computer Education and Instructional Technology, Hendek, Sakarya, Turkey

Abstract

This research proposal has been planned and suggested in order to contribute to the supply of this need. In this research, a learning system will be designed, improved and tested to increase the primary school children' awareness of dental health and to reduce their dental anxiety. When the proposal has been completed, with the education of about 10.000.000 primary school children, a functional product will be developed to increase the awareness of dental health and to reduce dental anxiety, which are the most significant issues for the student of this age. The generalization of this product usage are not covered with this proposal, therefore this proposal has a potential to cause a new proposal. The learning system which will be developed by this proposal can be adaptive to the students' learning styles and their socio-economic level which are reported to be efficient factors in terms of dental health in the field literature. Moreover, this research proposal also has the originality in terms of being a case study, which will provide the opportunity of an adaptive learning system that is a current approach in the field of educational sciences.

© 2013 The Authors. Published by Elsevier Ltd. Open access under CC BY-NC-ND license.
Selection and/or peer-review under responsibility of Prof. Dr. Huseyin Uzunboylu, Near East University, Faculty of Education, Cyprus

Keywords: Adaptive learning, learning modality, preventive dentistry, dentist anxiety;

1. Introduction

According to the results of numerous epidemiological studies, in our country both dental and gum health are not given enough importance; therefore, teeth loss because of tooth decay and gingivitis has remained as a very widespread problem. Teeth loss brings psychological, physiological and aesthetic issues along with it. Besides, prosthetic treatment requirements due to early teeth loss is needed and this causes economic losses in high-cost (Altun, Güven, Başak & Akbulut, 2005). This problem is commonly seen in pre-school and school-age children.

---

* Corresponding author: Özlem Çakır. Tel.: +0-312-3633350-3210.
E-mail address: ocakir@ankara.edu.tr.

Furthermore, the lack of awareness about dental health and children's dental anxiety are two most significant obstacles to the solution of this problem. There are many descriptive studies to identify the problems related to the issue. In these studies, the importance of implementing the programs in educational institutions in which the correct information is given to individuals about oral health starting from an early age is always emphasized (Altun, Güven, Başak & Akbulut, 2005; Yaramış, Karataş, Ekti &Aslantaş, 2005; Ceylan and Turan, 2009). However, the number of the studies in which implementations and improvements have been made in order to solve the problems is very poor. Therefore, the need for the research, which provides solution and product improvement has a priority and it, is extremely common (Seçginli, Erdoğan & Demirezen, 2004). The main issue of this research proposal is the usage of learning materials that can be adapted to learning modalities that form the one dimension of learning style and have a close relationship with awareness and anxiety in terms of psychological aspect. The purpose is to increase the primary school students' awareness regarding teeth health and to reduce their dentist anxiety within the frame of dental health education. We think that it is necessary to relate the issues of dental health awareness, dentist anxiety, adaptive learning and learning modality with each other and the objectives of this research.

2. Dental health awareness

In Turkey, descriptive studies have been conducted about students' health issues regarding health in schools. However, there have not been any studies in which implementations and evaluations have been done for the solution of the problems and the results of services (Seçginli, Erdoğan and Demirdizen, 2004).

When the results of epidemiological studies conducted in our country to determine oral health were evaluated, it is seen that a little importance is given to dental and gum health and teeth loss is in a very high level due to tooth decay and gingivitis (Gibson & Williams, 1999; Altun, Güven, Başak and Akbulut, 2005). Teeth loss brings psychological, physiological and aesthetic issues along with it. Besides, prosthetic treatment requirements because of early teeth loss are needed and this causes economic losses in high-cost (Altun, Güven, Başak and Akbulut, 2005).

As a conclusion of several studies, it is significantly emphasized that generalization of preventive dentistry services is needed to prevent oral-dental diseases (Altun, Güven, Başak and Akbulut, 2005; Önsüz and Hıdıroğlu, 2008; Gökalp, Güçiz-Doğan, Tekçiçek, Berberoğlu and Ünlüer, 2007; Ayrancı, 2005). Pre-school and school age children are the top priority groups in terms of public health. According to the data from the year 2008 by Health Ministry, there are over 16 million children at the primary and secondary school age and this age group requires special attention in terms of health. In most of the similar studies conducted over teeth, it is stated that implementation of programs in which the correct information about oral health is given to individuals starting from early ages in educational institutions will affect dental health. Besides, this effect can reach sensible levels; therefore, it is stated that preventive health care services need to be increased throughout the country (Altun, Güven, Başak and Akbulut, 2005; Yaramış, Karataş, Ekti and Aslantaş, 2005; Ceylan and Turan, 2009).

When the studies were examined, it was seen that dental health awareness in our country is directly associated with socio-economic levels. However, by looking at the results of the studies conducted abroad, it is observed that there is very little awareness about dental health in our country. The majority of awareness in our country has a treatment purpose and it is learned during the treatments. It can be understood from the anxiety level, which was observed in the studies conducted that there are not enough information courses relevant to the issue in the curriculum of the Ministry of National Education.

3. Dentist anxiety

There are little differences between Fear and Anxiety even though it was seen that Fear and Anxiety were usually used in similar meanings when we examined the studies about dentistry. The most important difference is that there is a definite clear factor in Fear while Anxiety is a more general concept that includes unknown or indefinite factors (Zafersoy, Akarslan and Erten, 2009). However, this little difference is usually ignored in the studies. The terms the citing sources in this research proposal use were used according to the preference of citing source when it needed to

be used in their original meanings. When it is looked from the perspective of research proposal, the usage of the term "anxiety" was generally preferred.

The prevalence rate of dentist and dental treatment fear in society is higher than the prevalence of fear in the other areas. Various factors like socio-economic levels, education and experience can cause this situation. That a significant majority of the patients is anxious about or afraid of dental treatment was proved by tests. When we examined these tests, it was discovered that these patients do not have enough check-ups due to fear and anxiety (Kömerik & Muğlalı, 2005). In the tests, which were done to eliminate fear and anxiety, it was seen that giving information to the patients has huge importance. It was observed that due to the education given at earlier ages, individuals feel at ease about oral health more than the others do. Another important issue at this point is that when the patients were informed about the treatment process and they were introduced to the equipment, it was seen that fear and anxiety rate was considerably reduced (Usalan, Erten, Karademir & Eryılmaz, 2009). In other words, individuals who have had the information about dental health from early ages feel at ease about dental treatment compared to other patients by attaching more importance to the issue.

Another important issue at this point is that some patients have fear and anxiety without having any experiences. The reason for this is creating a pre-judgment system because of some environmental factors as well as the usage of the equipment that they are not familiar with and have not seen before. In today's world, it is known that oral health directly affects other health problems; therefore, that individuals do not go to the dentist because of fear damages their future and their families' future in a considerable extent (Işıkaslan, 2001; Elçioğlu, 2000; Pekiner, 1999; Eroğlu, 1998; Özperk, 1996; Yazgan-İnanç, Çelik, 2003). According to the data of Ministry of Health, people in our country go to the dentist mostly for tooth extraction. In other words, it was determined that 20 % of the people who go for dental treatment have this treatment to extract their teeth. Besides, it was observed in various studies that the first reason of going to the dentist is tooth decay and treatment (Muğlalı, Koyutürk & Sarı, 2006). When we examined this data, it was observed that people see the dentists for the purpose of treatment. When we combine our findings with the results of other studies, it is highly possible that people can confront pain for the first time at the dentists where they go for treatment purpose; and this causes people to have pre-judgments and feel anxious about the dentists. In other words, because patients who do not go to the dentists to have regular check-ups for preventive purposes cannot get correct information, they cannot give necessary importance to oral health; therefore, they will have oral and dental problems. There will be no chance other than treatment at the dentist where they go because of the pain. At this point, a process that the individual faces for the first time and the pain he/she gets during this process because of his/her own mistakes will keep the individual away from treatment and preventive methods/ measures and this will cause to create a fear against dentists and dental treatment.

4. Adaptive learning

Each student has a unique experiential background, different talents and personal interests. Students usually do not exhibit same forms of behaviors; they do not have same objectives; they have different levels of desire; they have different ways of solving problems; they are not motivated by the same objects/things; they are not willing to learn something at the same time or at the same pace (Keefe, 2007). Learning is personal for each individual at least to some extent. At this context, adaptation of learning and teaching is significant. The ideal is that each school structures and develops learning process according to the need and capacity of each student (Keefe, 2007). In other words, school system must be structured according to the student (Diack, 2004).

Adaptive teaching system comes to mind when adaptation of teaching to the individual is considered; it is the concept that can be replaced by personalized teaching. In personalized teaching system, we can mention that we personalize teaching by placing the words such as names that students are familiar with or best-supported team's name into the learning content. However, adaptive teaching systems are hyper-environments where the learning environment is structured and the teaching is personalized for each student by setting a model of student's targets, interests and preferences (Brusilovsky, 1998). While developing adaptive education systems, information is collected about the student, a student model is structured, student model is updated and navigation is adapted with the presentation.

Because in adaptive learning systems the student is the user, the main approach in designing these systems is to focus on determining learning characteristics and making adaptations in the learning environment according to these characteristics (Jameson, 2003). There are two main technologies in implementing the adaptations (Brusilovsky, 1998): They are adaptive presentation and adaptive navigation. In today's learning systems, although the use of adaptive systems have not become widespread due to the difficulties of designing and developing process, it is seen that there is an increasing interest about this extremely new field in the field literature (De Bra, 1998; Brusilovsky, 2003; Kaplan, Fenwick and Chen, 1998).

It is proved that connections provided according to students' "pre-knowledge" pave the way for learning during the process of research and navigation in adaptive teaching systems. It is seen that adaptive navigation technologies in general terms enable students to reach their targets, reduce navigational complexity and increase the satisfaction (Brusilovsky, 1998).

Navigation in multi-environments is a complex task and individual differences play an important role in the form of navigation (Höök, Sjölinder and Dählback, 1996). Therefore, adaptation of web environments according to the individuals will minimize negative effects like getting lost in the environment, cognitive over loading, level of anxiety, and will increase efficient information search by decreasing the time and effort during the elimination of irrelevant topics (Somyürek and Atasoy, 2008).

However, it is seen that traditional applications in hyper- environments that provide same page content and same connections (Navigation structure) for all users are ineffective in meeting personal learning requirements of individuals who have different knowledge, needs and interests and also in generating student motivation (Somyürek, 2009). The fact that individuals have different personal characteristics and different learning modalities, they process the information using different methods and prefer to use different information sources cause learning requirements to differ while using the same environment (Somyürek, 2009).

In the phase of adaptive presentation, presentation can be adapted according to different variables. Variables like user knowledge level, user interests, user objectives, user skills, user cognitive level, and user learning style are some main variables (Brusilovsky & Millán, 2007). When it is considered that learning process is designed according to the need and the capacity of each student, it is extremely important to make adaptations according to the students' learning modalities that can differ in each student and which is one of the most significant concepts for learning.

5. Learning modality

Each individual has different characteristics. Identifying/determining all these different characteristics is neither possible and practical nor necessary for learning processes of individuals. It can be seen in most of the studies that some student characteristics such as age, gender, level of readiness for learning or the level of foreknowledge are effective over learning. In general sense, it is possible to collect student characteristics that are accepted as effective in three groups (Şimşek, 2002; Heinich, Molenda, Russel and Smaldino, 1996):

5.1. Group characteristics

These are the descriptive characteristics such as age, level of education, profession, position, title and levels of cultural or economic status. A superficial analysis can even be considerably guiding in choosing teaching methods and materials.

5.2. Pre-knowledge level

What the students know or are able to do about the content that will be taught is their pre-knowledge level. Students can get bored if they are presented with what they have already had. Students can feel a sense of failure in a learning environment where they lack necessary basic skills to comprehend what is presented. A teaching, which is not sensitive to students' pre-knowledge level, is a waste of time for both the student and the teacher.

5.3. Learning styles

Learning style is usually described as individualistic characteristics and a group of preferences that explain how the students perceive learning environment psychologically, how they interact with the environment and how they react. There are two main dimensions of learning style, which are students' preferences in getting information and interacting with their environments and preferences of cognitive processing of the information. The dimension about the preferences of getting the information and interacting with the environment is called learning modality. Despite different approaches, learning styles are grouped under three categories named visual, auditory and kinesthetic (Şimşek, 2002).

6. Conclusion

With this project proposal, it is aimed to adapt preventive dental health content according to students' learning styles and to present this content to primary school students who are in a significant level in terms of public health education. Thus, it is aimed to control whether awareness occurred in the students about preventive dental health and whether it has an influence over their level of dentist anxiety.

Presenting adaptive learning techniques at earlier ages will set up a substructure in the children about dentists, dental treatment and especially preventive dental health care. Consequently, it can be contributed to the elimination of the fear and anxiety that were mentioned to have been the result of lack of information at an earlier age and create self-awareness about the issue in all the society. The use of adaptive learning techniques causes the reasons of fear and anxiety created especially in children to decrease or even disappear by getting correct information. With the motivation that can be created by the curiosity and the interest in children for the use of today's technologies, children can get rid of fear and anxiety that have already been created in the individuals faster by the amount of time that can be saved through fast learning methods. The reason why adaptive learning is the most effective technique at this point is that the resistance that the individual is likely to show will be reduced by means of special adaptive study. Besides, pre-judgments can be eliminated through fast data provided by a technique, which is different from a person and an environment that store information daily in the individual.

References

Altun C, Güven G, Başak F, Akbulut E. (2005). Evaluation of children in the age group of 6 to 11 with respect to oral-dental health, *Gulhane Medical Journal, 47:* 114-118.

Ayrancı, Ü. (2005). A Study On Dental Caries In A Group Of Primary School Students, *Sted, 14* (3).50-54.

De Bra, P. (1998). Adaptive Hypermedia on the Web: Methods, techniques and applications, *Proceeedings of the AACE WebNet'98 (pp.*220-225), Orlando, FL: AACE.

Brusilovsky, P. (1998). "*Methods and Techniques of Adaptive Hypermedia*", Adaptive Hypertext and Hypermedia Editorler: P. Brusilovsky, A. Kobsa, J. Vassileva, Boston: Kluwer Academic Publishers, 1-44.

Brusilovsky, P. (2003). "Adaptive Navigation Support in Educational Hypermedia: The Role of Student Knowledge Level And The Case For Meta-Adaptation", *British Journal of Educational Technology,* 34(4), 487-497.

Brusilovsky, P. & Millán, E. (2007). *User Models for Adaptive Hypermedia and Adaptive Educational Systems.* The Adaptive Web Methods and Strategies of Web Personalization. Lecture Notes in Computer Science. Springer Berlin / Heidelberg. 0302-9743 (Print) 1611-3349 (Online).

Ceylan, S. S. ve Turan, T. (2009). The Evaluation Of School-Health Nursing Practices in A Primary School. *Fırat Journal of Health Services, 4*(12).35-49.

Diack, A. (2004). Innovation and Personalised Learning. *Education Review, 18* (1), 49-55.

Elçioğlu, H. (2000). *Oral health status in occupation health and reorganization*. Unpublished Phd Thesis. İstanbul University Institute of Health Sciences, Public Health, USA.

Eroğlu, S. (1998). *Dental diseases and oral health at the Sardis population.* Unpublished Master Thesis. Ankara University Institute of Social Sciences.

Gibson S & Williams S. (1999). Dental caries in pre-school children: association with social class, toothbrushing habit and consumption of sugars and sugar-containing foods. Caries Res; 33:101-113.

GÖKALP S, Güçiz Doğan B, Tekçiçek M, Berberoğlu A, Ünlüer Ş. (2007). The Oral Health Profile of 5, 12 and 15 Year Olds, Turkey-2004, Türkiye-2004. *Journal of Hacettepe Faculty of Dentistry. 31*(4). 3-10.

Heinich, R., Molenda, M., Russel, J.D. ve Smaldino, S.E. (1996). *Instructional media and technologies for learning*. Fifth edition. NJ: Printice-Hall, Inc..

Höök, K., Sjölinder, M. ve Dahlbäck, N. (1996). Individual differences and navigation in hypermedia. Eighth European Conference on Cognitive Ergonomics (ECCE-8), Grenada, İspanya.

Işıkaslan, T. (2001). *The Evaluation of the oral health and the socio-economic status of 6-12 years old cihldren who attent to our clinic*. Unpublished Phd Thesis. Ankara University. Institute of Health Sciences Pedodonti ABD.

Jameson, A. (2003). *"Adaptive Interfaces and Agents",* Human-Computer Interaction Handbook, Editorler: J. A. Jacko, A. Sears, Mahwah, NJ: Erlbaum, 305-330.

Kaplan, C., Fenwick, J. & Chen, J. (1998). "Adaptive Hypertext Navigation Based on User Goals and Context", Adaptive Hypertext and Hypermedia, Editorler: P. Brusilovsky, A. Kobsa, J. Vassileva, Boston: Kluwer Academic Publishers, 1-44.

Keefe, J. W. (2007). *"What is Personalization?"*. Phi Delta Kapan International.

Kömerik, N. & Muğlalı, M. (2005). Anxiety Control in Oral Surgery:Patient Information. *Atatürk University, Faculty of Dentistry 15*(3), 25-33.

Muğlalı, M., Koyutürk, A. E. & Sarı, M. E. (2006). The Effect of The Interaction of Children and Parents on Oral Health Application. *Atatürk University, Faculty of Dentistry, 16* (3).27-32.

Önsüz, M. F., ve Hıdıroğlu, S. (2008). Determining Personal Hygiene Practices of Students in Two Different Primary School in İstanbul. *Journal of Adnan Menderes University, Faculty of Medicine, 9* (1).09-17.

Özperk, G. (1996). *Oral Health Care Quality Assurance Research*. Unpublished Phd Thesis. Hacettepe University Institute of Health Sciences.

Pekiner, F. (1999). *In İstanbul, different socio-economic aspects of the two primary schools comparative evaluation results for applied of oral and dental health education.* Unpublished Phd Thesis Marmara University Institute of Health Sciences. Oral Diagnoz and Radyoloji ABD.

Seçginli, S., Erdoğan, S. ve Demirezen, E. (2004). School Health Screening Program: A Pilot Study Sample. *Sted. 13* (12) 462-444.

Somyürek, S. ve Atasoy, B. (2008).Naviation Adaptation: Why and How?. *8th International Educational Technology Conference (IETC2008)*, 6-9 May 2008, Eskişehir, Türkiye.

Somyürek, S. (2009). Adaptive Learning Environments: A New Paradigm in Educational Hypermedia Design. *Journal of Information Technology*. 2(1). 29-38.

Şimşek, N. (2002). BİG16 Learning Modality Inventory. *Educational Science and Practices 1* (1). 33-47.

Usalan, G., Erten, H., Karademir, S.U. & Eryılmaz, M. (2009). The study of the dental anxiety of the patients attending dental policlinic the municipality of Çankaya. *Journal of Selcuk University Faculty of Dentistry*. *18*: 38-47.

Yaramış, N, Karataş, N., Ekti, F. ve Aslantaş, D. (2005). Determining Oral Health Conditions and Habits of Primary School Students in Central Nevşehir. *Sted-2005 14*(12), 256-259.

Yazgan-İnanç, B., Çelik, M. ve Görgün, H. (2003). Dental Fear Scale: Validity and Reliability Study. *Journal of Turkish Educational Sciences. 1*(1).43-51.

Zafersoy-Akarslan, Z. & Erten, H. (2009) Dental Fear and Anxiety. *Journal of Hacettepe Faculty of Dentistry. 33* (1). 62-68.