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Designing the Dental Mobile Application of "Dana and Dentistry" and Evaluating the Quality of its Illustrations by Parents

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Abstract

Background: The picture book "Dana and Dentistry", with practical topics of pediatric dentistry, telling stories for preschoolers as simple line drawings, is in the initial design stage. Parents play a pivotal role in choosing books for offspring. Therefore, parents' correct understanding of illustrations in the book was of great importance. The present study aimed at designing the dental mobile application of "Dana and Dentistry" and evaluating the quality of its illustrations from the parents' perspective.

Methods: The present descriptive-analytical study, with a cross sectional design, developed a raw mobile application coded by experts, through which the quality of its illustrations was evaluated by parents enrolled by the convenience random sampling method. Data was analyzed with SPSS version 24 using ANOVA, considering P = 0.05 a level of significance.

Results: The mobile learning application of "Dana and Dentistry" was designed. From among 320 parents enrolled in the survey, 86.25% were female and 13.75% male, with a mean age of 32.51±5.4 years. The subject of book chapters was predictable for more than 90% of the participants. The quality score of illustrations was above 9 (out of 10). The qualitative evaluation of illustrations was neither significantly correlated with age (P = 0.511) nor with gender (P = 0.526).

Conclusion: The illustrations on the mobile application of "Dana and Dentistry" were clear and expressive from more than 90% of the parents' points of view; and they were satisfied with the design, coloring quality, and character of the Dana cartoon.

Key Words: Children, Parents, Picture Book, Training Application, Quality Evaluation.

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1- INTRODUCTION

Today, wireless technology, especially cell phones, is a revolution in education and can be considered one of the most important learning tools. Learning through mobile applications increases satisfaction, involves learners in effective communication activities, and enables learning, regardless of time and distance (1). Due to the interest of users and the position of mobile in the current society, the attitude towards mobile should be shifted from a decorative product to an educational interface (2).

Mobile health (m-Health)-i. e., the use of mobile devices in medicine and public health practices, is rapidly expanding in e-health and improves healthcare and medical services. The m-Health is designed to promote healthcare and improve services to healthcare providers (3). However, technology has extensively advanced to motivate general and oral health surveillances. Modern technology and software for oral health education are widely available in dentistry (4).

Parents play a decisive role in shaping the behaviors and habits of offspring. Parents can positively affect the health-related behaviors of children (5). Parents' perspectives also influence supporting and encouraging children to maintain health (6). The parents play a role in diet, behavior, oral care activities, and receiving professional dental services in children aged five years and younger (7). Training and motivating parents to maintain oral hygiene and nutrition in their children can change their behavior (8). Parents need the training to achieve ideal preventive care for a healthy diet, good oral hygiene, and supervision for dental health maintenance in their children. Oral health information should effectively be disseminated, further practical recommendations provided, and access to dental care facilitated in order to promote (9) the knowledge and skills of parents in caries etiology and reduction of bacterial distribution, brushing with fluoride toothpaste, flossing and controlling child’s toothbrush behaviors, reducing the consumption of sugar, snacks, and the bottle, understanding dental caries process, the role of fluoride in preventing caries, the best time to go to the dentist, and their logic expectations (7). A cost-effective way to reduce the risk of childhood caries is to brush twice a day; justified parents apply methods such as group games to promote their children benefit from toothbrush advantages. Parents can use oral hygiene books for children to encourage them to the toothbrush. Studies show no significant relationship between the frequency of brushing and child age and that it is just the result of parental efforts and interventions at all ages of the child (10).

The picture book "Dana and Dentistry", rounded up by a pediatric dentist, includes 18 chapters and 131 schematic paintings illustrated by a female painter for kids. The illustrations are simple and storytelling to make a lasting and broad effect on the target population, increase awareness of dental science and its application in caries control and prevention to empower them to make a better choice and decide in the face of dental diseases and injuries (11). Pictures of the stated book were presented to preschool children and more than 60% of them showed an appropriate understanding regarding the pictures (12).

Parents are the first teachers of offspring, and their correct understanding of illustrations on the application is of great importance. Considering the close relationship between parents and their young children, parents play an important role in the process of selecting and reading books for them so in the present project, the quality of illustrations in the dental health application of "Dana and Dentistry" was evaluated from the perspective of the users- i.e., parents.

2- MATERIALS AND METHODS

2-1. Designing the Dana and Dentistry application

The raw mobile application was coded by programming experts. The information in the book "Dana and Dentistry" was separately entered into the raw format of the application in batches and designed as an Android application that could be installed on mobile phones.

2-2. Evaluation of the quality of illustrations by the users (parents)

2-3. Study design and population

A total of 10 kindergartens were selected from different areas of Kerman, Iran, using the cluster sampling method, and after coordination with their authorities, 320 parents of preschoolers were selected by the convenience sampling method and enrolled in the study after obtaining informed consent. "Dana and Dentistry" dental health application was installed on users' cellphones. Then, the quality of illustrations in the book "Dana and Dentistry" was evaluated using a researcher-made electronic questionnaire, which its reliability and validity were confirmed earlier.

The first part of the questionnaire included the demographic information of parents and children (age and gender). In the second part, the parents were asked to guess the subject of each chapter after seeing the illustrations in the book. In the third part, the parents were asked about the quality of illustrations in every 18 chapters.

2-4. Inclusion and exclusion criteria

Parents participating in this study had at least one preschool child. They also needed access to an android device in order to be able to install the “Dana and Dentistry” application. Furthermore, parents who were not capable of learning how to work with the application or for any reason were reluctant to participate in the study were excluded.

2-5. Ethical consideration

The present descriptive-analytical study was registered at Kerman University of Medical Sciences (ethical code: IR.KMU.REC.1399.24).

2-6. Data Analysis

Data were analyzed in SPSS version 24 using ANOVA; P-values less than 0.05 were considered significant.

3-RESULTS

3-1. Design and build of "Dana and Dentistry" application

The application used the extensible markup language (XML) in Java software, and it was compiled with Android Studio software version 3.6 in order to build an Android application that can be installed on mobile phones. **Fig. 1** shows the home page of the application or the illustration on the back cover of the book.

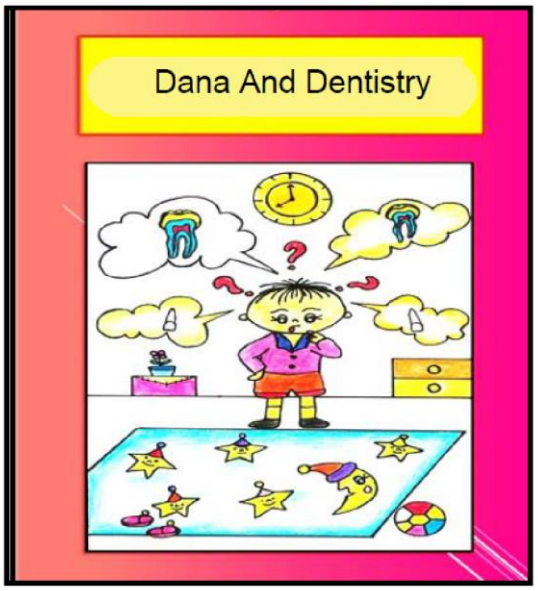

Fig. 1: The Home Page of "Dana and Dentistry" Application

3-2. Evaluation of the quality of illustrations on "Dana and Dentistry" application

Totally, 86.25% of parents were female and 13.75% male, with a mean age of 32.51±5.4 years, ranging from 25 to 45. The mean age of the children was 4.18 ±3.2 years, and 61.25% of them were female (**Table 1**).

The results obtained from the parents' descriptive answers, including the number and percentage of false and true answers on each chapter, are reported in **Table 2**. The results showed that illustrations on each chapter were clear to more than 90% of the parents, and they could correctly guess the subject of the chapter.

Table-1: Demographic Information of the Study Participants

Demographic Information		Number	Percentage
Parents’ gender	Female	276	86.25
	Male	44	13.75
	Total	320	100
Children’s gender	Female	196	61.25
	Male	124	38.75
	Total	320	100

Table-2: Users’ responses for each chapter based on the illustrations on the book

Chapters of the book "Dana and Dentistry"	Correct Answer (Percentage)	False Answer (Percentage)
1. What are the tooth parts?	308 (96.25)	12 (3.75)
2. What are the shapes of the crown and roots of the teeth?	294(91.87)	26(8.125)
3. Does a deciduous tooth have nerves?	298(93.12)	47(6.87)
4. Does deciduous tooth denervation damage permanent teeth?	310(92.18)	25(7.82)
5. What are the side effects of deciduous tooth extraction?	298(96.86)	10(3.3)
6. What is the space-maintainer?	301(94.06)	19(5.94)
7. At what age do deciduous teeth grow?	302(94.37)	18(5.62)
8. Are you aware of the growth of the first permanent molar?	300(93.75)	20(6.25)
9. Do you know the number of deciduous teeth?	297(92.81)	23(7.18)
10. What to do when multiple rows of teeth are formed?0	315(98.43)	5(1.56)
11. What is the most proper way to brush your children's teeth?	304(95)	16(5)
12. Are you familiar with the fissure sealant technique?	298(93.12)	22(6.8)
13. At what age is fluoride mouthwash advised?	298(96.87)	47(6.87)
14. Do you know the cause of tooth decay?	302(94.37)	18(5.62)
15. Do iron drops cause black discoloration of teeth?	313(97.81)	7(2.18)
16. What to do if a tooth is knocked out?	311(97.18)	9(2.82)
17. What to do if a dental crown is damaged?	298(93.12)	22(6.88)
18. Do you know when the best time for the first dentist visit is?	296(92.5)	24(7.5)

Fig. 2 shows the average quality score of users on book illustrations. Illustrations on all 18 chapters of the book "Dana and Dentistry" were of high quality (scored >9) from the viewpoint of the parents, and illustrations on chapters 11, 12, 14, 16, 17, and 18 had the maximum quality (scored 10).

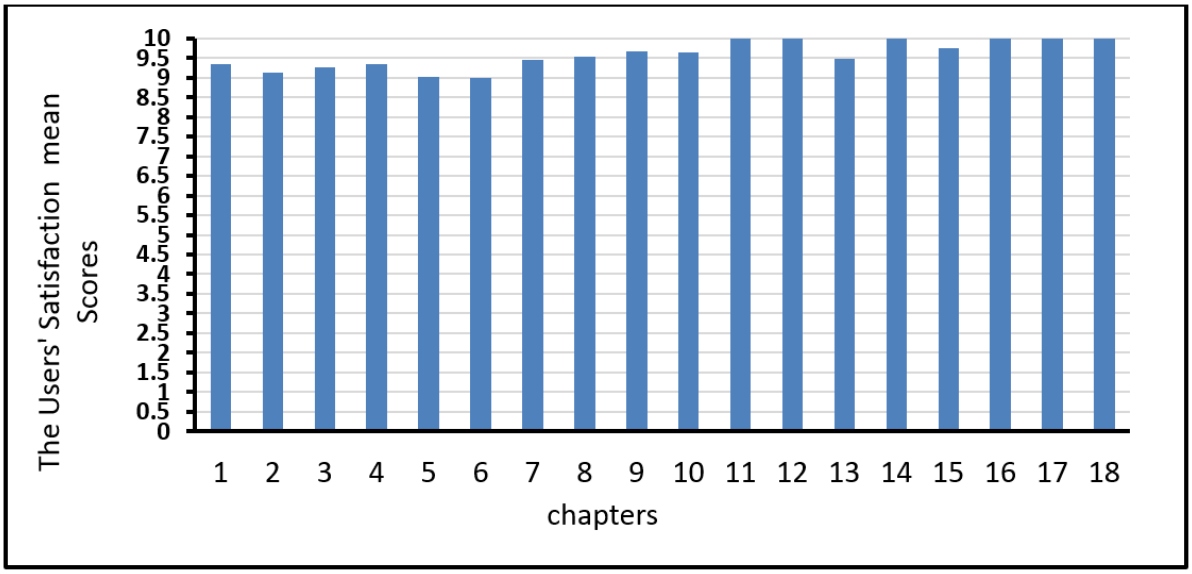

Fig. 2: The users' satisfaction mean scores (0-10) on the Chapters of the Book "Dana and Dentistry"

Table 3 shows that the qualitative evaluation of the illustrations was neither significantly correlated with age (P = 0.511) nor with gender (P = 0.526). In addition, none of the variables of the children's age (P = 0.535) and gender (P = 0.575) were significantly correlated with the quality mean scores of the parents evaluating the illustration.

Table-3: The correlations between the users' satisfaction mean scores and their Age and Gender

Variable	The Quality Assessment Scores of the 20-Item Questionnaire, Based on a 10-Point Scale				
Age	Years	Mean	SD	Number	P-value
	20-25	9	0.20	47	0.511
	26-30	9.03	0.21	131	
	31-35	9.11	0.35	66	
	36-40	9.01	0.09	53	
	41-45	9.11	0.27	18	
	>45	9.12	0.25	4	
	Total			320	
Gender	Male	9.08	0.21	43	0.526
	Female	9.04	0.24	277	
	Total			320	

4- DISCUSSION

In the present study, the mobile dental health application of "Dana and Dentistry" was designed for installation on Android mobile phones. This dental health application can effectively and widely be

used for different purposes of education, communication, support, and motivation among the patients. Borhani et al., showed that the use of mobile phone applications for distance nursing could reduce the serum levels of glycosylated hemoglobin in patients with type 2 diabetes (13). Ghazisaeedi et al., showed that more than 82% of the users were satisfied with an application designed for caring for children with cerebral palsy and met their information needs (14). Safdari et al., showed that the users were satisfied with the application designed for tuberculosis (15). Alizadeh et al., also indicated that more than 78% of the users approved the effects of educational information on the application (16). Technology is widely available in oral hygiene (3) and has advantages in pediatric dentistry for the child and his parents. Children today are more familiar with technology; and dental health applications can help in a wide range of areas, including familiarizing them with the dentist's office environment, dispelling fears and misconceptions about dentistry, and promoting oral hygiene. Aljafari et al., reported that a game-based oral health education could be as satisfying and effective as one-to-one education in improving knowledge in high-risk children. Even the education could lead to positive dietary changes in some families (17). Duijster et al., reported that media tools were attractive to young patients undergoing long-term dental treatments, such as orthodontics, and improved their compliance. It is difficult to maintain and promote oral health of children for a long time (6). Huebner et al., revealed that even if the level of parental education is low, good oral hygiene improves when children are supported by technologies designed for this purpose. Their study also showed that home-based oral health programs are almost accepted by all young patients (18). Zotti et al., similarly, showed the role of devices and applications for oral health management in promoting the cooperation of young patients (19). They indicated that the family has a prominent role in the control and prevention of diseases, and improving parental awareness is a positive step to promote self-care behaviors and relieve diseases (8). Nowadays, technology has extensively advanced to motivate individuals in general and oral health. Modern technology and applications for oral health education are widely available in dentistry (4). In a study, Sara L Nolen et al., designed and evaluated a mobile application to promote oral health and prevent early childhood caries (ECC) and reported that using a mobile application for this purpose potentially provides the opportunity to communicate and potentially help overcome the challenges of managing oral diseases such as ECC. (20) In addition to the above, parents play a key role in reporting their child's cooperation and can be a source for ordering more applicable media to support oral health. This concept is more practical in private offices, where the dentist, young patients, and their parents have a closer communication, compared to the larger hospitals (4). The application of technology seems desirable in health promotion. The scientific principles should be followed in the design of such applications, and necessary care has to be taken in the application of evidence-based content. Tiffany et al., identified and evaluated a number of Android or IOS applications of oral health for adults. They reported that although many applications are available, their quality is generally poor (21). A key point in this regard is the availability of technology tools used to increase and maintain compliance over time to prevent a lack of interest, especially in young patients. Technology development can challenge the users with ongoing competitions and goals by building new, well-designed applications with regular updates, an aspect that is of great importance to young patients (4).

The results of the present study showed that each chapter's illustrations were clear to more than 90% of parents and they could correctly guess the subjects. Parents were also very satisfied with the application; hence, it can be widely used in promoting the quality of oral health in children. Francesca et al., showed in a study that the knowledge and socio-economic status of parents often affect children's oral health and motivation to regularly visit the dentist. They examined the effect of an oral health application on patients aged 4-7 years and the relationship between parental education and children's oral health. Accordingly, 100 patients were randomly assigned to the case and control groups. All patients and parents were trained before intervention in oral hygiene practices as chair-side. The case group was given an auxiliary application for oral health practices. A 12-month follow-up showed that the case group had better oral health and cooperation than controls. It seems that parental education affects children's oral health (4). Therefore, the role of families in determining the general and oral health of children is undeniable. Parents have always faced challenges in caring for offspring teeth. In many cases, they do not have enough information to take appropriate measures to maintain children's oral health, and in other cases, they need to strengthen their motivation for this purpose. It seems that application design can be a step in overcoming many barriers to children's oral health. However, obtaining such results requires further research to evaluate the knowledge and practice of the application visitors.

4-1. Study Limitations

The main limitations of the study included the impossibility of face-to-face interviewing the users due to social distancing guidelines for the COVID-10 pandemic and the lack of access of some parents to Android phones.

5- CONCLUSION

"Dana and Dentistry" application was designed for installation on Android phones. More than 90% of the parents correctly guessed the subject of each chapter of the application, only based on illustrations; and their quality assessment scores on illustrations were above 9 (out of 10). There was no significant correlation between their responses and their age and gender, as well as the age and gender of their children.

6- CONFLICT OF INTEREST

None.

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