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EMPOTİ: EMOTIONAL EDUCATION FOR AUTISTIC CHILDREN

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Abstract

This paper describes mobile game development for autistic children. Firstly, the researches about the characteristics of autistic children are given. The visual and audio materials required for the game were taken from Gazi Education Faculty Special Education Department. Similar work is done in this area. All these studies have been examined and evaluated with their advantages and disadvantages. The development of the game is designed according to these results. Because, in other studies, complicated explanations and designs are made and the use of animation pictures can be disadvantageous. The development stages of the game are explained in detail. The materials used in the game and all stages are explained together with the visuals. The game has been tested with an autistic child and the results are reported in the paper.

Keywords: *Autism, visual and auditory material, game, mobile application, autistic child*

EMPOTİ: OTİSTİK ÇOCUKLAR İÇİN DUYGUSAL EĞİTİM

Özet

Bu çalışmada otistik çocuklar için mobil oyun geliştirme işlemleri anlatılmaktadır. İlk olarak otistik çocukların özellikleriyle ilgili yapılan araştırmalara yer verilmiştir. Oyun için gerekli görsel ve işitsel materyaller Gazi



Eğitim Fakültesi Özel Eğitim Bölümünden alınmıştır. Bu alanda yapılmış benzer çalışmalar mevcuttur. Tüm bu çalışmalar incelenmiş olup avantaj ve dezavantajlarıyla değerlendirilmiştir. Oyunun gelişimi bu sonuçlara göre tasarlanmıştır. Çünkü diğer çalışmalarda karmaşık açıklama ve tasarımların yapılması ve animasyon resimlerinin kullanılması dezavantaj oluşturmaktadır. Oyunun geliştirme aşamaları ayrıntılı bir şekilde açıklanmaktadır. Oyun içerisinde kullanılan materyaller ve tüm aşamaları görsel öğelerle birlikte anlatılmaktadır. Oyun, otistik bir çocukla test edilmiş ve bu değerlendirmeye sonuçlar raporda yer almaktadır.

Anahtar Kelimeler: *Otizm, görsel ve işitsel materyal, oyun, mobil uygulama*

INTRODUCTION

In this study, a mobile game for autistic children was developed. The aim of the game is to prepare autistic children daily. The basic inability of autistic children is social. Such people often do not establish eye contact, stay away from humans, and make unusual noises. They have difficulties in understanding human emotions. At the same time they are inadequate to show their own feelings. These qualitative children are inadequate in social skills because they have problems understanding other people's emotions, thoughts and facial expressions. This situation can also be called social blindness. Emotion recognition plays a very important role in the education of autistic children. Because children's social development is primarily proportional to their ability to recognize and use emotional expressions (Eliçin & Avcıoğlu, 2014).

This developed game offers children a fun learning environment. In the voting there are visual papers that can capture the interest of the child. Because such children are sensitive to visual and auditory stimuli. Therefore, we use colorful backgrounds and audio-visual transitions. An environment in which to enjoy learning is offered. Our children teach emotional expressions to autistic children.

Puzzle games are available for children who have passed the learning stage to reinforce their learning. These puzzle games are made up of real life human faces. Your game has been named as EMOTION in accordance with the operations performed.

RELATED WORKS

Our children teach emotional expressions to autistic children. There are similar games. However, many different concepts are directed towards teaching. The games that teach emotions were made using animation. An autistic child can not clearly understand the feelings of real people in a teaching with animations. In our game, this emotion is taught using real human faces. On this

count, the feelings of an autistic child can learn better about real life events and people. Emotional expressions are also divided into separate categories. There is also a learning auxiliary category besides education in our game. In these categories, the child learns the feelings. Every emotion that is to be played is introduced in the animation video of the emotional expression of that stage before the stage.

There are face-to-face educational activities on autistic children, usually prepared by educators. The child continues this education only in those settings. For example, according to a study conducted in 2014, empathy for children with autism was achieved by using the replica silencing method. This study was conducted for 4 years with 3 autistic children. At the end of 4 years, it was observed that the target children continued their skills after the training was over. In the study, firstly emotion states were taught with 12 picture cards. Training with audio effects has been continued. In the study, a number of lines were taught using "push to talk" devices. The child is imitating the voices coming out of this device and taught the behavior that should be against the situations that are encountered in daily life. During the training, the child is given the ability to pair, distinguish and express himself verbally. It has been observed that after the replica is over, the children have increased in speaking skills. It has been observed that the students who have completed the training have been able to live more easily with the gains they have received and the research results are close to 100% (Eliçin & Avcioglu, 2014).

Another study conducted in the field of autism is the Behavioral Education Program for Children with Autism (CAIDEP). Experts in the field are involved in this study. After this study applied to children with autism, it has been determined that many children have attained the desired targets and many values are taught. There are various levels of knowledge and skills required for the child to be included in the content of the OCIP. In the OECDEP project, mapping, imitation, language and game skills are included. In this basic and intermediate education, the child is given many skills (Aslan ve diğ, 2009).

Another study on autistic children is based on measuring the effects of games and toys on children with autism. In a study conducted by an expert named Liccordello, it was seen that suggestion, praise and reward especially in pre-school education increased social responses and invitations of autistic children. Proper directions and practices of appropriate games have proved that autistic individuals can give positive results when autistic children are invited to social activities. It has been observed that each of the game genres divided into four different groups as a manipulative game, a socio-dramatic game, a symbolic game and a functional and descriptive game add different things to the child (Korkmaz ve diğ, 2012). It has been observed that in the games



performed collectively in the individual or the schools, the socialization and the improvement process of the children increase and the games are very useful (Veziroğlu & Gönen,2012).

These trainings are given in our country and in other places in special education centers. Children with financial means can benefit from this education mostly and for limited time. However, a virtual education can be used in any environment where the child is transported and for children who do not have financial means (Eliçin & Avcıoğlu, 2014)..

Other work has also been developed on IOS that is made in the field (Şenyürek ve diğ, 2017).

There are many games to teach emotions in virtual markets that serve users like Google Play and AppStore. Emotional situations are taught in real paintings using real human figures and animations¹. Another application is for the puzzle game. The placement of puzzle pieces is easy to help autistic children play games. Color and visual materials are used.

DATABASE

Figure 1 shows the data schema of the Internet database. In the information registered in the database, the user information is given to the system by the trainer at first entry. The score information is the information that the user has acquired since playing the game. Level information is the level at which the user finishes the game before exiting. Puzzles and separate levels for learning are kept in the database. The score information of the other option that the user does not even play one of the two options during the game is exactly the same in the database. All this information is collected and finally registered in the database. The types of information in the database are automatically adjusted according to the resources they come from. User information is in string type because it is retrieved from text field. The score information is in the integer type as it is calculated in the game. The level information is in the integer type as it is taken from the level information that is played. As there is not much information in the database used in the vote, there is no need for an advanced database. Single table provides storage of necessary information. There is no need to use ER or EER diagrams in the schematic display of this table.

It is possible to use FireBase database with internet connection as shown in Figure 1. To create a database of projects on this platform, you need to register with Google account and log in later. The records in the database are kept with an automatic id assigned by the system. Id is kept with user name, score, education and puzzle level.

¹ <https://play.google.com/store?hl=tr> (26.02.2018).



Figure 1. Adding A Sample Record To The Firebase Database

GAME WORK STAGES

Four basic headings in the education of autistic children are the front plan. These consist of the child's problematic behavior, communication skills, other skills and independence. Our project is to develop empathy in the sense of learning the emotions and to give them the ability to communicate.

An easy interface design has been designed to make the application easy to use and understand during the design phase. On the entrance screen of the designed game there are two options of learning and puzzles.

First, the child is required to successfully complete the learning phase. Then the transition to the puzzle part is provided. In the learning phase, comparative learning screens are presented for 4 different emotional expressions. First of all, for the teaching of the concept of "happy", real human photos composed of 3 stages are used.

The first part is taught to provide a happy feeling by offering two options to be "happy-sad" in the first phase, "happy-angry" in the second phase and "happy-frightened" in the final phase.

These stages also apply to the other three concepts (unhappy, angry and frightened). It is aimed that these concepts will be taught with 3 options at a later stage of the game. Each section has a "star" figure on the screen in response to each correct answer given at each step. After the 3 stages in each section are completed, a new division transition is achieved. In the game puzzle stage, puzzles are made for 4 different emotion states. This puzzle is being presented gradually to the user.

The Puzzle section has 4 parts for 4 different emotion states and 2 parts for convenience. The child is expected to place these two pieces of puzzle properly. The way to place one of the pieces in the wrong place is being controlled and prevented from casting.

Many object and script files have been created for the operations to be performed during the use of the game (Figure 2). These values are linked to each other. A button tool has been used to perform some functions on the game's login screen. Because the button was not used in the initial design of the game, the game was switched to a certain point on the android device. However, since clicking in this way becomes very difficult, the use of the button has been thoroughly explored and integrated into the game. The general operation diagram of the game is given in Figure 3.

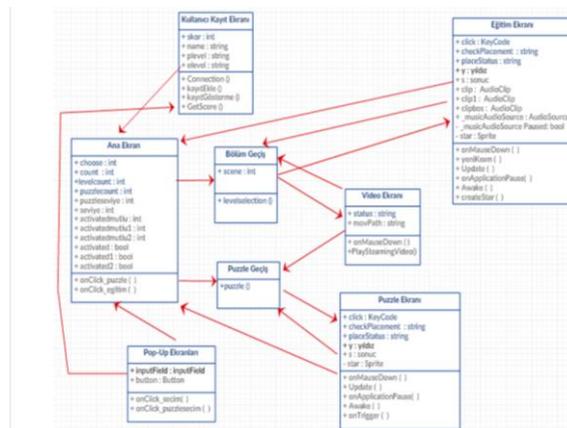


Figure 2. UML Diagram

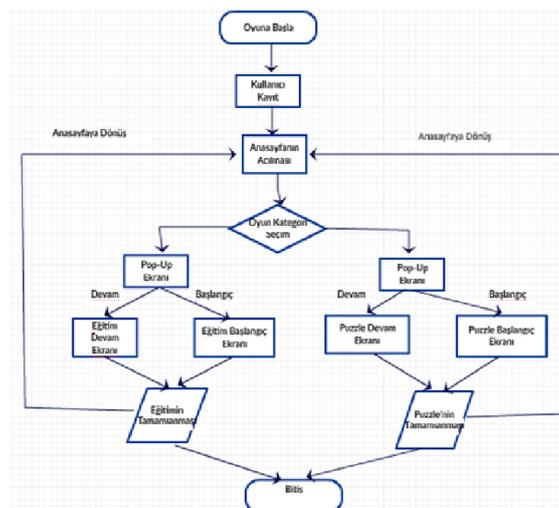


Figure 3. General Operation Diagram of the Program



Interfaces on the Game Screen As shown in Figure 4, user information is recorded on the registration screen and recorded in the database. First of all, name-surname is taken from the text field and this information is kept in the game. The score and level information obtained after the end of the game is presented to the user and registration is performed.



Figure 4. Login Screen

As shown in Figure 5, the two alternative screens presented after the login screen consist of two game buttons, training and puzzle. According to user selection, redirects to other screens. The exit button is connected to the screen in Figure 6 and the user information and score information are displayed on the pop-up screen. At the same time, the level information of both games is recorded in the database along with this information.



Figure 5. Score Display Screen



Figure 6. Section Selection Screen

If the game's puzzle option is selected, a screen as in Figure 7 is presented to the user. On this screen, the user is expected to place the pieces of the puzzle in the correct places. For example, in Figure 7, part A must be placed on part A1 and part B on part B1. Incorrect positioning is prevented and orientation is made for the user to do the right thing.



Figure 7. Puzzle Screen

Figure 8 shows two or three selection screen when the user selects the training screen. On this screen are pictures of happy, unhappy, angry and scared feelings. When the correct selection is made, the star figure is placed on the screen and the score information is displayed on the screen. When the three stars are completed, the transition to the next emotional state is made.



Figure 8. Training Screen

Whichever option is selected in the rating, the user is presented with a pop-up screen as in Figure 9. If the user is a new user, this screen will not open. In this case, the user name is checked in the database. If you are a registered user, this pop-up screen will appear, telling you whether or not to load the level information you last played in the related game. No button indicates that the game will start from the beginning. When the user presses the yes button, it is ensured that it continues from where it was left.



Figure 9. Level Selection Screen

After selecting the game's puzzle option, a simulation screen is displayed as in Figure 10 to show how to play puzzles before a screen is loaded as in Figure 10. This screen automatically shows how each part should fit into the appropriate area. After this screen, the puzzle game is opened.



Figure 10. Video Training Screen

SUGGESTIONS AND DISCUSSION

After the development of the game was completed, he tried on autistic children. A study was conducted in cooperation with autistic children and instructors to achieve the purpose of the game and the results of success on the children. For this reason, Gazi Education Faculty Special Education Department Application Center was visited. It was discussed with the instructors and children. The children who were there were allowed to play the game in the presence of the instructor, and the reactions of the children and the ability to complete the game were observed.

In this center, a test was performed with 5 autistic children aged 2-6 years. However, the developed game does not fully understand the emotional state of some of the very young children. It is observed that the children who know the feelings can easily play the game. Improving the precision of clicking on the pictures makes it easier for children to play the game. It has been observed that the children have used the "return" button when they are playing with the instructors, and when they are bored with the game. They are also provided with the help of their instructors when they are bored.

In this center, the game was tested with many autistic children with different characteristics and age range. In this study, the reactions of the children to the game were observed. According to the results of the observation, the audio, video effects and colorful background used in the game

attracted the attention of the children and made them focus on the game. In the later stages of the game, children are distracted and need to be directed by their instructors.

According to the test results made at the previous center, it was observed that the children had difficulty in painting the pictures in both the education and the puzzle categories, so the problems in the pictures were eliminated. It has been observed that children are making the right choices easier by means of development. The animation videos used in the game learning phase attracted the attention of the children and made them happy. The voice instructions in the game helped the children to fulfill their duties. The fact that the puzzle stage consists of two parts makes it easier for the child to understand and complete the task. It also makes it easy for children to play puzzles with the puzzle animation shown on the screen before playing the puzzle. Such games provide children who know their emotional state to reinforce their knowledge and have a pleasant time. More complicated, less visually impaired, no sound material, and written games make it difficult for children to play. This is why the project we are doing is more useful and useful especially for children who know their emotions. In addition, thanks to the database registration of the pop-up screens used, instructors have better observed the children's situation and development.

CONCLUSION

Results of testing the game have been observed. Children can follow the game with interest and success with their instructors. Children's age levels and sickness ratings play a role in their play. The level of 2-piece difficulty involved in the puzzle stage of the game was considered sufficient for an autistic child. It is agreed with the expert trainers that the child can be forced at 4 or more levels. For this reason, the result that the game should have 2 level puzzles has been removed. It has been observed that human pictures used for emotional state should be more sensitive to autistic children. So, the buttons are used in the pictures. In order to measure the success of each child, addition of the database was carried out. It is understood that the game needs to be played by the children's instructors. Because the updates made to the game require the intervention of a more adult individual. The game must be adult first and guide the child accordingly. With the restrictions in the play, children are having difficulty playing the game.

Mobile games developed for children with autism should be supported by clear and simple interfaces, audio and visual cues to make it easier to play and achieve successful results. Because these kinds of things make it easier to learn by attracting autistic children. In order for such applications to be able to reach and benefit people at all stages, the profit should be developed without any purpose.

RECOMMENDATIONS

A lot of research has been done in our project to be useful for children with autism and to provide good learning. Extensive research has been done on these children before the game was developed. Many articles have been read and discussed with experts who have been involved in the education of autistic children on the advice of our teacher Prof. Dr. Suat Özdemir in order to help in this matter. Their recommendation and wishes have been decided on the course of the game. In addition, the training set used in the game was supplied by Assoc.Prof.Dr. Selda Özdemir and his team. The child's stimulating voice material is used. The animated videos used to teach emotional expressions make it easier for the child to play without distracting. The child's success was encouraged by star animation and sound elements. Using real photographs of people makes it easier for the child to match emotional situations to real life. The latest test of the game was made through the relevant institutions.

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