

THE EFFECTIVENESS OF TEACHING ENGLISH WITH MAKEY MAKEY IN CHILDREN WITH AUTISM SPECTRUM DISORDER

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Abstract

In this study, activities programmed with Scratch Program prepared with Makey Makey were prepared. Makey Makey is a new technology that enables the creation of various sounds by coding the keys on the device after connection to the computer via USB. It is aimed that the practitioners produce different products both in terms of electrical conductivity and in line with their own needs. It is potentially exciting for students and practitioners because it meets the requirements of easy operation and low cost. In the embedded teaching method, which is made by reducing the clue gradually, the effectiveness of teaching English to children with autism spectrum disorder was investigated. In the study, multiple-polling model was used from single-subject research models. The persistence of learning was controlled by monitoring sessions at the 1st, 2nd and 4th weeks after training was completed, and the generalization effect of the research was examined as pre-test and post-test. Collective and daily polling, teaching, monitoring and generalization sessions were organized during the research process. All sessions were conducted as one-to-one instruction. In the research, inter-observer reliability and application reliability data were collected. The findings of the study reveal that embedded teaching with the gradual reduction of clue in the activities programmed with the Scratch Program prepared with Makey Makey is effective in teaching English concepts to children with autism who need special education. It also shows whether persistence can be maintained through monitoring sessions after the teaching sessions and that generalization sessions are effective in generalizing what is learned to different people, tools and environments.

Keywords: Autism, embedded teaching, English teaching, Makey Makey, special education.

1 INTRODUCTION

Education and training is also extremely effective and vital for individuals with various disabilities. In order to bring these individuals into society, the education they receive in line with specially trained personnel and specially prepared training programs are called special education (Milli Eğitim Bakanlığı, 2007). One of the various disability groups receiving special education is autism spectrum disorder. Autism spectrum disorder, first described by Kanner in 1943, is a form of developmental disorder. Kanner observed in a study that a group of students showed different development in certain areas compared to others and this difference was observed even in early childhood (Kanner, 1943). For this reason, autism spectrum disorder is defined as one of the common developmental disorder observed in early childhood (Diken, 2018; Reichow, & Volkmar, 2010). It was emphasized that it was a genetic disorder (Gupta, & State, 2007) and was associated with a neurobiological condition (Cotugno, 2009). Considering the characteristics and needs of individuals diagnosed with autism spectrum disorder, it was determined that the programs and applications that were prepared contributed positively (Ozonoff, Rogers, & Hendren, 2003; Özdemir, 2007). It is known that educational programs including applied behavior analysis based on operant conditioning are frequently used for individuals diagnosed with autism spectrum disorder. The operation of this program in turn; determination of performance level, identifying areas where skills are lacking or limited, the existing talents are included in

the appropriate program piece by piece and rewarding every positive development (Darıca, Abidođlu & Gümüřçü, 2005). Another application of applied behavior analysis is error-free teaching methods (Kayaođlu & Görür, 2008). This method is an application that advocates that only positive answers should be taken into consideration in order to teach the concepts in the best and most permanent way, not mistakes or mistakes made at the time of teaching. In order to implement such a method, there are three important points for the experts to focus on. These;

- a) The concept to be gained should be presented considering the performance level of the student.
- b) When necessary, skills analysis should be developed and the concepts to be gained should be divided and given.
- c) Strategies such as modeling or giving clues should be developed in order to gain a new concept.

In addition to learning a new concept, it is also very important for an individual who is diagnosed with autism spectrum disorder to use this concept in the face of a different person or in a different environment. Therefore, in the stage of teaching the concept that is desired to be learned, the application of teaching together with embedded teaching by gradually decreasing the clue can be more effective in generalizing the concepts or skills acquired in autistic individuals. Embedded teaching is the concealment of the teaching practices related to the behavior that is aimed to be gained into ongoing activities (Kurt, 2009). It is known that such applications and programs will contribute to gaining independent life skills to individuals diagnosed with autism spectrum disorder by using various technologies. For example, with clues or reminders, pictures can be vocalized to teach the concept to be taught to individuals diagnosed with Autism Spectrum Disorder. In addition to this, a variety of teaching methods can be used to develop programs and applications specific to Autism Spectrum Disorder Individuals (Murdock, Ganz & Crittendon, 2013). It has been determined that applications using technology as a learning tool or as a reward after learning contribute positively to individuals with ASD, both in their attention span and in their motivation (McEwen, 2014).

There are technology based trainings aimed at gaining social skills for individuals diagnosed with autism spectrum disorder and scientific studies examining the effectiveness of these technological training (Warren, Zheng, Swanson, Bekele, Zhang, Crittendon, & Sarkar, 2015; Lee, Chen & Lin, 2016; Chen, Lee & Lin, 2015; Yun, Kim, Choi, & Park, 2016; Williamson, Casey, Robertson, & Buggley, 2013). When we talk about such studies, it can be mentioned that Makey Makey, which many researchers in the world started to work on. Makey makey is a device that connects to conductive or semiconductor materials by means of cables and controls and moves the objects on the computer screen and converts the material to which the cables are connected to touch keys Silver, Rosenbaum, & Shaw, 2012). It is a potentially exciting situation for makey makey users because it is cheap and simple to use. Makey Makey is a new platform for improvising concrete user interfaces. It allows people to create interfaces based on nature, it is enough to use to connect to the computer with USB input connection, does not need a different installation or installation. It is designed to be easily used by experts or beginners (Collective, & Shaw, 2012). Sound output and management is provided entirely by the user's computer. Recorded sounds are output through a speaker connected to the computer so that both the practitioner and other individuals in the environment can listen to the common sounds. The activation of sounds depends on the contact structure to be established through Makey Makey to allow the conductive material to which the cables are connected to interact with the software. Therefore, it will be easier to concretize the concepts of Makey Makey and similar technological devices, especially in individuals diagnosed with autism spectrum disorder who have difficulty in learning abstract concepts. Koçbeker, and Saban, (2005) in a single-subject qualitative study of English teaching for autistic individuals is given by material and toys. In this study, the teaching of English is given as purely technology-oriented. The inability of autistic children to abstract concepts was also taken into consideration. The training was carried out by vocalizing the words to be taught with Makey Makey technology and presenting this teaching to the autistic children in a completely concrete manner. In this study, repetitions, which play a key role in the learning process, can be realized both in a concrete and simple way. Therefore, it is usual for individuals with autism spectrum disorder to benefit from this and lead a more productive life. In addition, another study using this technology, which examines the effectiveness of concept teaching programmed using Makey Makey, has yet to be found. For this reason, this research has original values as it is one of the first studies supporting English teaching with Makey Makey. It is known that researches and scientific studies continue abroad. However, no teaching English to children with autism and Makey Makey technology not being used in Turkey is aimed to prepare the children so that they can use. This study is important in terms of providing an example for the use of different disciplines in the treatment of autism and education of individuals diagnosed with ASD and contributing to the future studies on this subject.

1.1 The Aim of the Study

The main purpose of this research is; Within the Scratch Program activities prepared with Makey Makey, it evaluates the effectiveness of embedded instruction applied by step-by-step reduction method in teaching English vocabulary to children with autism spectrum disorder and the answers below these basic questions have been sought. Within the Scratch Program activities prepared with Makey Makey, embedded teaching prepared with the method of **reduceng** the clue gradually:

1. Is it effective in teaching targeted English words in children with ASD?
2. Are the English words taught permanent in the first, second, and fourth weeks after the end of instruction in children with ASD?
3. Can the English words taught to children with autism spectrum disorder be generalized?

2 METHODOLOGY OF RESEARCH

2.1 Research Model

In this study, among the single-subject research models, the multiple-polling model was used among the polling-stage behaviors. The multiple start level model allows simultaneous analysis of multiple dependent variables (Sarı & Öğülmüş, 2015).

2.2 Participants

The participants consisted of 3 male children diagnosed with mild autism spectrum disorder. Children are continuing their education in a school affiliated to the Ministry of National Education.

2.3 Dependent-Independent Variable

The dependent variable of this study was determined as autistic children's telling the English name of the fruits shown to them with the simultaneous clue. The independent variable of the study is the simultaneous clue teaching to subjects with Makey Makey technology.

2.4 Instruments

In this study, Makey Makey Electronic circuit board, computer, application prepared with Scratch Program, tools required for target skills, analysis of target skills, data collection record charts were used.

2.5 Implementation Process

Experimental process; It consisted of different and varied processes such as collective polling, daily polling, teaching, monitoring and generalization sessions. All sessions conducted by the researcher during the application process were recorded on video. It has created data recording forms for recording these records. In the research, two types of polling sessions were conducted: General polling sessions and daily polling sessions. Initial data were collected on whether autistic children knew the English names of the fruits. After the initial data analysis, it was determined that all autistic children had the same starting level and Makey Makey application was started to learn children learn English names of fruits. When the goal of learning the English names of the fruits was reached, the polling-stage was included for all autistic children and the data was collected on top of each other. When the English names of the first group fruits were acquired the ability to learn and say, it was seen that the skills of saying fruit names in the second group were in the same percentage with the level of onset. After the polling-stage, the application of the second group fruits was continued in order to gain the ability to say and learn. The same practices were repeated in order to gain other skills. These procedures were applied to introduce the fruits of three different groups for autistic three children and to teach their English names of these fruits. Monitoring sessions were conducted after the first, third and fourth weeks after the completion of the teaching. Generalization sessions were implemented immediately after the second, third, and fourth collective polling sessions. In all application sessions, sessions were recorded with data record forms and sessions were recorded with video.

2.6 Data Collection Tools

In this study, various data such as effectiveness, generalization and reliability data were collected. Effectiveness, monitoring and generalization data were collected by recording the correct and incorrect responses of the target skills taught by the researchers to the data record forms. The percentage of correct response was then calculated. These data were collected by the researcher during the sessions and recorded on the forms. The data collected by watching the video recordings were recorded to the teaching

data form with simultaneous clue. The two observers independently monitored the video footage of the study and recorded the necessary data on the forms. Application reliability data were obtained to evaluate how teaching was performed.

3 FINDINGS

In this section, the effectiveness of teaching and the results of generalization findings are given.

3.1 Findings of the Effectiveness of Simultaneous Clue Teaching

Percentages of correct responses related to Arda, Batuhan, and Cem's Start Level, Daily Polling, Collective Polling and Monitoring processes are given respectively. When the graphs are examined, it is seen that there is a similarity between the starting levels of the three children who participated in the education and their situation during and after the teaching. Figure 1 shows Arda's start level, daily polling, collective polling and monitoring data.

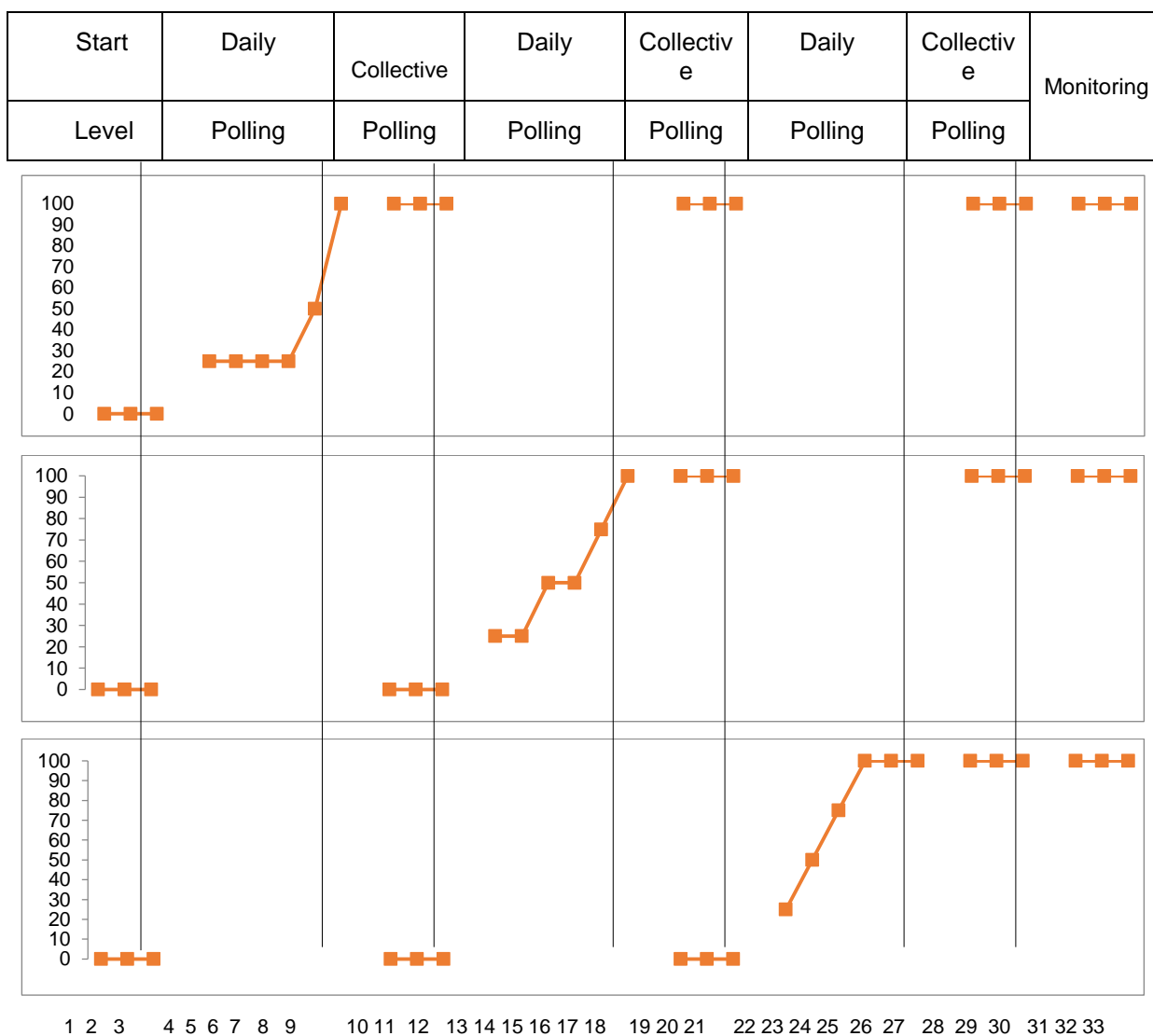


Figure 1. Arda's graph showing the English names of fruits presented in three different groups and the frequency of learning and saying skills

As shown in Figure 1, as a result of Arda's simultaneous clue teaching sessions, the percentage of correct answers to the ability to learn and say the English names of fruits; It was found to be 100%. According to the data in the registration forms obtained from the monitoring sessions, it was concluded that the target skills learned by Arda were maintained 100% one, three and four weeks after the completion of the teaching. Figure 2 shows Batuhan's start level, daily polling, collective polling and monitoring data.

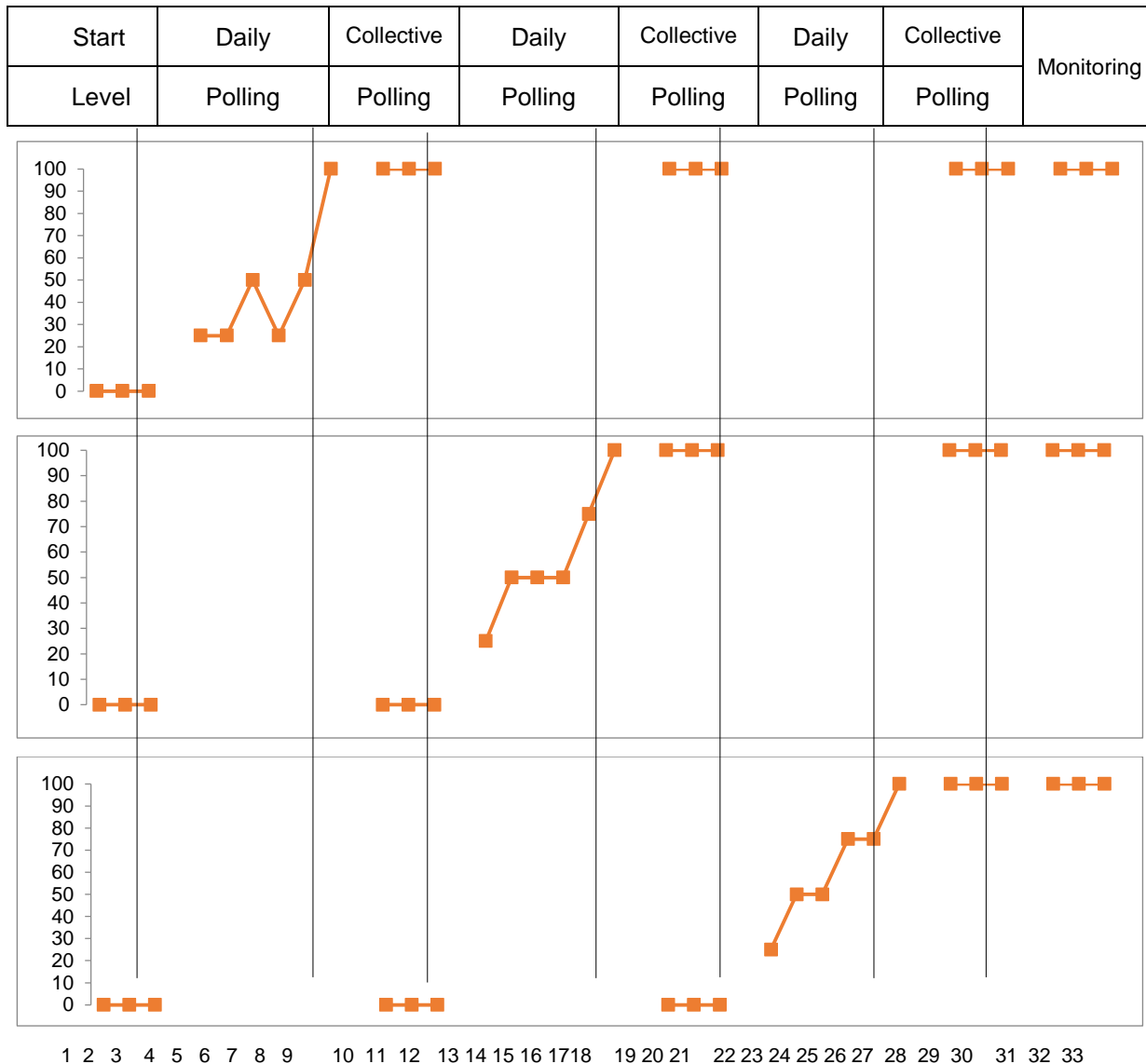


Figure 2. Batuhan's graph showing the English names of fruits presented in three different groups and the frequency of learning and saying skills

As shown in Figure 2, as a result of Batuhan's simultaneous clue teaching sessions, the percentage of correct answers to the ability to learn and say the English names of fruits; It was found to be 100%. According to the data in the registration forms obtained from the monitoring sessions, it was concluded that the target skills learned by Batuhan were maintained 100% one, three and four weeks after the completion of the teaching. Figure 3 shows Cem's start level, daily polling, collective polling and monitoring data.

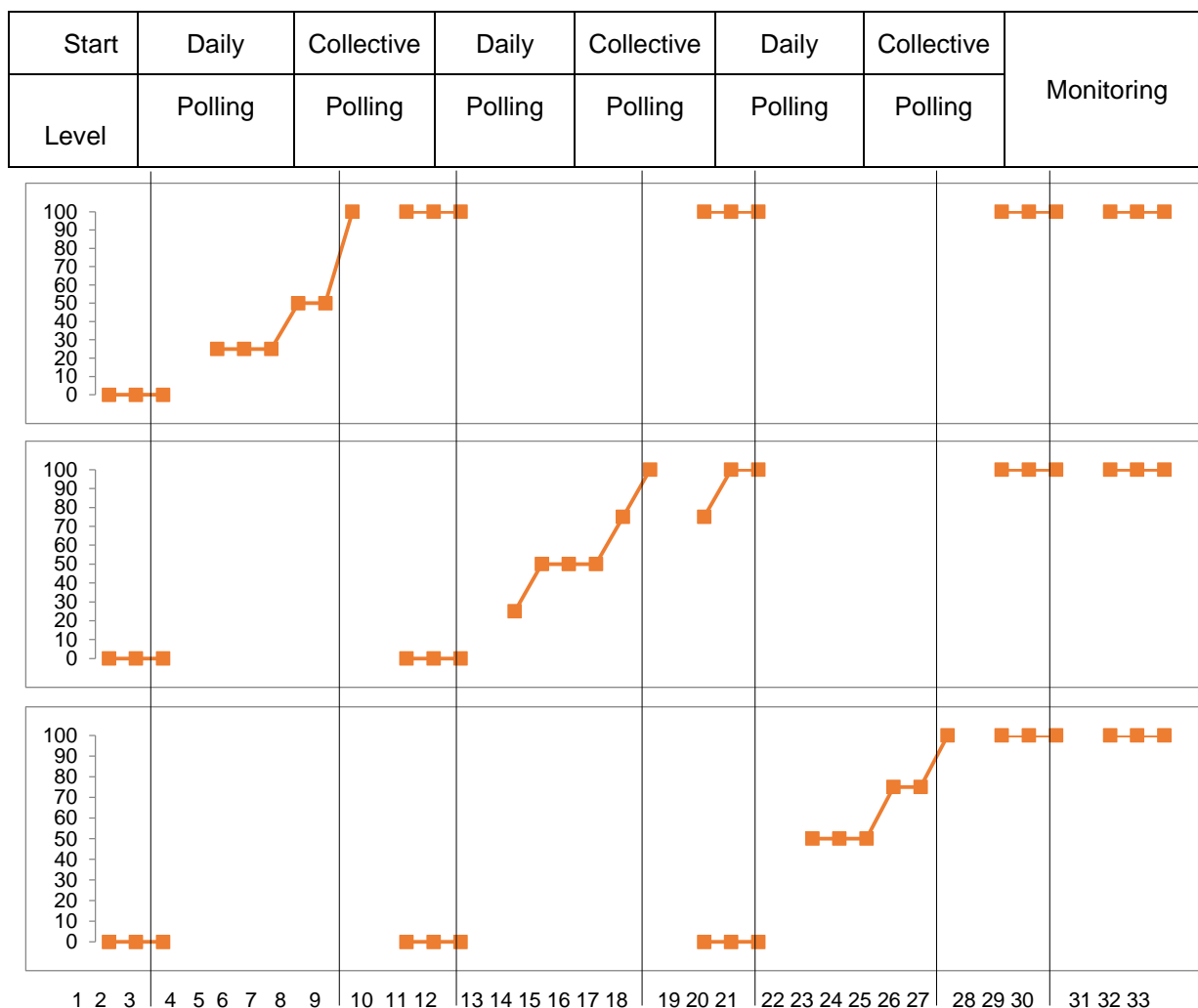


Figure 3. Cem's graph showing the English names of fruits presented in three different groups and the frequency of learning and saying skills

As shown in Figure 3, as a result of Cem's simultaneous clue teaching sessions, the percentage of correct answers to the ability to learn and say the English names of fruits; It was found to be 100%. According to the data in the registration forms obtained from the monitoring sessions, it was concluded that the target skills learned by Cem were maintained 100% one, three and four weeks after the completion of the teaching.

3.2 Generalization Findings

The generalization data of this research were determined by using pre-test and post-test methods. Generalization results were obtained from the generalization sessions data after collective polling sessions. In the research, generalization was made between different tools and different environments. A generalization study was conducted between different tools and environments in a different environment than the place used in daily and collective polling sessions. Figure 4 shows a generalization graph for autistic children to achieve their targeted skills in different materials and environments.

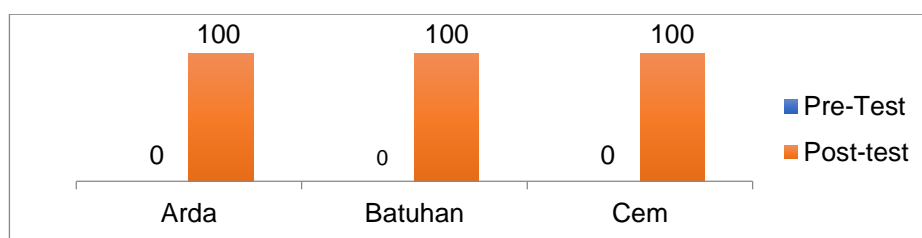


Figure 4. Percentages of true answers by Arda, Batuhan and Cem in generalization sessions

As shown in Figure 4, In the pre-test generalization session of Arda, Batuhan and Cem, it was determined that the skills related to the target concepts were at the level of 0% and all children did not answer correctly to any question, whereas in the post-test generalization sessions, all autistic children were able to achieve 100% target skill. They had answered the skills they learned with 100% correct rate with different media and materials.

4 CONCLUSION AND DISCUSSION

The findings of this study were: (1) simultaneous cue instruction through Makey Makey is effective in teaching target skills, ie the fruit names in English, in children with autism, and also the findings (2) showed positive results related to monitoring and generalization. According to the data collected during the monitoring sessions, it was concluded that the target skills were preserved and (3) they could generalize with different tools and different environments. With these findings, it can be said that the simultaneous cue teaching through Makey Makey is an effective method of learning and saying the English names of fruits in children with autism. Considering the recorded data related to the ability to learn and say fruit names in English, at the end of the application made with the simultaneous cue taught by Makey Makey technology; it can be concluded that this practice is effective in teaching Arda, Batuhan and Cem's skills of saying the English names of fruits in different groups based on 100% success level.

The scientific basis for using technology-based trainings in individuals with ASD; Wong et al. (2014) reported in "Scientific Based Practices for Children and Adults with Autism Spectrum Disorder". In this report, a total of 20 studies, 11 single-subject and 9 experimental groups, were reviewed and the effectiveness of the technology on individuals with OSB was demonstrated. Supporting education with technology, and presenting videos or still images (Acar, 2015; Bernad-Ripoll, 2007; Kim, Blair & Lim, 2014; Kutlu, 2016; Mancil, Haydon & Whitby, 2009; Ozdemir, 2008; Sansosti & Powell-Smith, 2008; Scatone, 2008; Turhan, & Vuran 2015; Vandermeer et al., 2015), it was observed that similar findings were reached and these methods were found to be effective in the development of social skills in individuals diagnosed with autism. In addition, Basil and Reyes (2013) stated in their study that a student diagnosed with autism spectrum disorder and another student with mental disability developed their reading comprehension skills through the software they developed. These findings support the effectiveness of technology in the concept teaching and the effectiveness of Makey Makey electronic circuit technology in this study.

According to the findings of the research, it is seen that similar results were found with the results of other studies using simultaneous cue teaching method in teaching skills (Tekin-lftar, 2008; Riesen, McDonnell, Johnson, Polychronis, & Jameson, 2003; Maciag, Schuster, Collins, & Cooper, 2000; Parrott, Schuster, Collins, & Gassaway, 2000). It can be concluded that simultaneous instruction with Makey Makey is an effective method for teaching skills. This result is consistent with the effectiveness results of the simultaneous cue teaching method compared to other studies (Schuster, Griffen ve Wolery, 1992; Singleton, Schuster, Morse & Collins, 1999; Çiftçi, 2007; Toper, 2006; Özbey, 2005; Topsakal, & Düzkanar, 2004; Yücesoy, 2002; Doğan, 2001). When the literature is examined, similar findings were found in the studies that convey social stories with the help of technology and present them with videos or fixed visuals (Sansosti & Powell-Smith, 2008; Mancil, Haydon & Whitby, 2009; Kutlu, 2016; Vandermeer, Beamish, Milford, & Lang, 2015; Ozdemir, 2008; Scatone, 2008). These methods were found to be effective in gaining social skills to individuals with autism. In these studies, concurrent clues were carried out in systematically planned educational environments and their effectiveness was demonstrated. Batu, Bozkurt and Öncül (2014) stated that teaching with simultaneous cue taught with visual support was effective in teaching skills to mothers with autism and it was one of the first studies using visual support. In another study, it was found that the mobile social story maps developed contributed to the development of listening comprehension skills of children with autism (Dargut Güler, 2019). In the study examining the effectiveness of simultaneous cue in color teaching to children with developmental disabilities, it was concluded that teaching with simultaneous cue was effective in telling the names of mathematical symbols and signs (Gürsel, Tekin-lftar and Bozkurt, 2006). These findings are important and effective in the use of technology on concept teaching, and this study supports the effectiveness of Makey Makey electronic circuit technology.

Based on the data and results of this study, various recommendations can be given for other researchers. Parents and siblings with a diagnosis of autism spectrum disorder, special education teachers working in educational institutions where children with ASD can benefit from Makey Makey electronic circuit boards to teach concepts to children with autism. Makey Makey can be effective to teach the English of various concepts. Makey Makey can be effective in teaching concepts to individuals in different disability groups. The research can be repeated by making applications in different environments.

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