

DIGITAL TECHNOLOGIES IN THE EDUCATION OF STUDENTS WITH

AUTISM SPECTRUM DISORDER

SMART-ASD Project Research Summary Report (O3)



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INTRODUCTION

According to DSM-5 diagnostic criteria Autism Spectrum Disorder (ASD): is a disorder which emerges in early development period, lifelong continuing, with different forms ongoing deficits in social communication and social interactions, limited, repeated behavioral patterns and shows itself with interests or actions, (American Psychiatric Association, 2013). Diken (2012) defines autism as a lifelong lasting neurological disorder which is discovered before the first 36 months of the life, having difficulty in understanding or can't understand the events happening outside World, having difficulty in communicating, untimely repetitive obsession, although they have different intelligence than normal children, they cannot use this competences as they don't understand outside World, avoid from eye contact. Children with autism is a heterogenic group which Show quite different characteristics from each other and they Show differences in terms of both the level of inability and behaviors that they display (Ataman 2009). Hence, different autistic behavior characteristics can be seen in individuals from mild to severe (Heward, 2013).

It is known that individuals who are diagnosed with ASD perform worse than their typically developing peers in terms of visual and verbal interaction, linguistic development and social interaction. In particular, they have difficulties in initiating, maintaining conversations, using gestures and mimics, sharing various activities with others, pointing out objects of interest, and showing objects to others (Carpenter, 2013; Eliçin, 2016). Inadequacies or limitations in communication affect many adaptive behaviors such as daily life and social skills and those individuals with such characteristics are prevented from succeeding in many areas such as educational achievements, social life and interpersonal relations and professional life (Walker ve Snell, 2013). It is difficult to talk about a single effective application in the education of children with ASD; but there are studies showing that they can learn best with visual support systems and care should be taken to use these systems in their education (Eliçin, 2015).



The most important way for the development of students with ASD is education. These trainings can be carried out in mainstream education environments with support training activities and in therapy centers (Ataman, 2009; Diken, 2012). Nevertheless, the developments in today's information and communication technologies have increased the use of technology and computer aided education practices in the education of these students.

Technology is defined as a phenomenon that is effective in enriching the educational environment in which the identified abilities and knowledge are developed (İşman 2008). Portable devices seem to be preferred in educational settings for reasons such as being portable, being social, providing ease of use, and offering a working environment for many skills (Adıgüzel ve Yılmaz, 2014). Along with the developing technology, it is necessary to utilize easily transportable and usable technological tools such as laptop, tablet PC, iPod and TouchPad in the education of autistic children (Hourcade, Bullock-Rest ve Hansen, 2012). Especially the spread of touch tablets brings both applications for ASD together with it (Özdemir, 2016) and the increase in the use of mobile technology, the necessity of using technology effectively in the training of individuals who have difficulties in communication skills and social interaction become more visible.

Technological devices are needed in the development of the ability to follow the instructions and rules, in reducing problems experienced in transitions between activities, in reducing problem behaviors, in the development of communicative skills and social skills, in social, daily life, leisure and in gaining independent life skills. Assistive technologies towards autistic students are used in the development of matching, mimicry, recipient and expressive language, social, academic skills, visual support and self-care skills (Çuhadar, 2008). There are Tablet PC applications in Turkey prepared by Tohum Autism Foundation for the children with autism and intellectual disability and for children with developmental problems to teach them daily life skills they need to know. These applications from Tohum 1 are for developing communication skills, and Tohum 2 is for developing matching skills. (Çitil, 2016). The Plan and Communication are other tablet applications which were developed with the aim of creating daily plans and improving their communication skills according to individual needs of children with special needs, especially children with autism.



When individuals with ASD use technology, they can learn new skills, become more motivated, show better concentration, interact more often with people in their environment, make choices and direct their own learning and play. In addition, when it is thought that images are "first language" visually for autistic individuals and words are considered second, the use of graphics to create visual presentations of the information by computers, tablets, and smartphones can be increase the attention level of these individuals. Researches show that technological devices are effective in gaining independent gaming skills, self-care skills, daily life skills, academic skills and in reducing the problem behaviors of the individuals with ASD. (Mcculloch, 2004; Stokes, 2008; Eliçin, 2015).

Tablet-based studies that fall into the category of high-tech devices are quite effective, as are other computer-aided applications for children with autism (Eliçin ve Tunalı, 2016). Computers, games are important leisure time activities for individuals with ASD and tablet computers have a positive effect on the creation of leisure activities, the enhancement of communication skills and the establishment of social interaction. Eliçin and Tunalı (2016) found that the study of the effectiveness of using tablet computers in the teaching of the use of schedules to children with ASD was effective in acquiring, maintaining and generalizing the skills of using each of the schedules with progressive help presented with tablets. As the visual timelines, picture exchange communication system and social stories used for children with ASD are software products that can be easily downloaded to devices, they provide new timelines and stories to be created. In addition to this, technology assisted prepared materials are possible to be arranged according to individual differences of the students or to be updated (Eliçin, 2016).

Technological devices have great contribution to the education of children with ASD. However, children need to be able to use technological devices to take advantage of these opportunities. They need to have basic competences such as switching on and off the device, pressing large or small buttons, adjusting volume, keeping tablet PC in balance etc.

In assessing the skills of children with ASD correctly, parents and teachers need to know about what are the best technologies to support the children. There are many web sites about autism and it is possible to get advice



from other parents by using these pages. However it is an important factor to consider that an application that is beneficial for a child, cannot provide the same contribution to another child's development. Teachers and parents have to first test the programs they have downloaded and decide whether these programs support their children's development. (Çitil, 2016).

There are also smart device applications that improve the basic skills of these children as well as web pages about the features and training of children with ASD. There are more than 200 applications written in different languages on the Internet. It is difficult, however, to decide which of these applications is appropriate for the level of child's using smart devices and the child's educational needs. At this stage it is necessary to know the level of the child's ability to use the applications, what software should be used at what level of computer and what kind of educational needs the child has. This is not easy and possible for many teachers, educators and parents. For this reason, there is a need for the applications that will assist families and teachers both to evaluate the individual needs of children with ASD to use smart devices that are compatible with the child's profile and in determining the software applications that are recommended for children. These applications can be done with face-to-face trainings. However, this method is difficult to disseminate and at the same time it won't be a cost efficient activity. Also, determining the level of technology usage of the student is possible through the use of a technological device. For this reason, smart software that determine the performance of students and their training needs will be the best solution.

With this research, testing effectiveness of a smart software is aimed which suggests the most appropriate smart software applications that can be used in education of children with ASD by determining their level of technology usage and educational needs. For this purpose SMART-ASD application has been developed. With the research the capacity of app recommendation suitable for the education needs of children with autism with this SMART-ASD app among the developed apps for children with ASD and the effect of these software's on the student's competences level which are required to be developed will be tried to define experimentally.



METHODOLOGY OF THE RESEARCH

Objectives of the research

The objectives of the research design should be twofold:

Study 1: Checking that the app provide the right recommendations from the point of view of the teachers knowing and working with the students with autism and intellectual disability. This part of the research can be done within SMART-ASD project length, as the required time to assess this is shorter and can be done with only one evaluation.

Study 2: Studying whether or not the recommendations provided by the app for each student are effective and have a positive impact in the life of students with ASD and ID. This will require much more time to study than the project length. However, the research design has been developed and implemented counting with the compromise from all participants to continue gathering data and using the app after the project end, so that this longer study can produce relevant research results that will inform about the benefit of the App in the medium term.

Research Sample

The sample of both studies is the same one, composed by 39 students with autism and intellectual disability from Spain (19 received intervention and 20 participated as controls) and 46 from Turkey (23 on intervention and 23 on control). All the Spanish participants had a diagnosis of ASD that was done using the ADOS test (Lord et al, 2012) by qualified evaluators prior to their enrolment in the study. All the Turkish participants were evaluated with a Tool named MİLLÎ EĞİTİM BAKANLIĞI (2008). An evaluation sheet of this tool is provided in English as Annex 1.

The Turkish sample of this research consists of students with ASD in autism units of the mainstream schools and special education job application schools in the center of Konya province. Before start to research legal permission from Konya Provincial Directorate of National Education was received. Special Education Teachers



working at schools such as Selcuklu Special Education and Job Application School, Serife Akkanat Lower Secondary School, Kadir Ozguzar Lower Secondary School, Ali Ihsan Dayioglugil Primary School, Karatay Job Application School students were defined in experimental group in a randomized way studied recommended apps with each student in experimental group for 6 months. The Spanish sample was composed by participants of Mira'm (Valencia), Aucavi (Madrid) and Autismo Burgos (Burgos) schools. The legal tutors of all participants included in the sample fulfilled and signed the Informed Consent Document, that received the approval of the Ethical Committee of the University of Valencia.

SMART-ASD project have also produced a 4-week MOOC (Massive Open Online Course) about how to choose the best technology for each individual with autism. This MOOC is available in English, Spanish, Turkish and Valencian at www.FutureLearn.com platform. In order to get a uniform sample in training opportunities, all the parents and teachers made this MOOC and had to approve the exams of the three first weeks of the MOOC prior to their enrolment in the study. On the contrary, this measure was not adopted with the Turkish sample, as it was considered that the training opportunities were very similar for most Turkish participants.



STUDY 1. About the validity of app recommendations from the point of view of the teachers

Description of the participants

SMART-ASD App gathers data around a number of variables in order to provide recommendations. This data includes the following information provided by families and professionals by means of the structured interviews contained in the App:

- Knowledge about technology
- Availability to invest time and money in technology
- Availability to invest time and money in learning new skills related to technology for autism
- Attitude towards technology

This information is calculated from the answers given by parents and professionals throughout dozens of questions and then synthesized into a final score (from 0 to 5) by means of a weighted formula. With this information it is possible to describe the population of the sample either individually or in group.

Table 1. Descriptive data of the Spanish Sample – Professionals’ Data

	Knowledge IT	Availability to invest in IT	Availability to invest in Training	Attitude Towards IT
Average	3,47	3,47	2,00	2,94
Standard Deviation	0,61	1,11	0,76	0,75

Table 2. Descriptive data of the Spanish Sample – Parents’ Data

	Knowledge IT	Availability to invest in IT	Availability to invest in Training	Attitude Towards IT
Average	3,29	2,23	2,44	2,87
Standard Deviation	0,86	1,24	0,94	0,78

As it can be seen in the previous tables, the standard deviation is low in most measures, but higher in relation to the Availability to invest Time and Money in IT, both in parents and professionals of the students involved in the Spanish sample. The following figure includes the averages of both groups in comparison, showing the biggest difference in the availability to invest in IT, which is much higher for professionals.

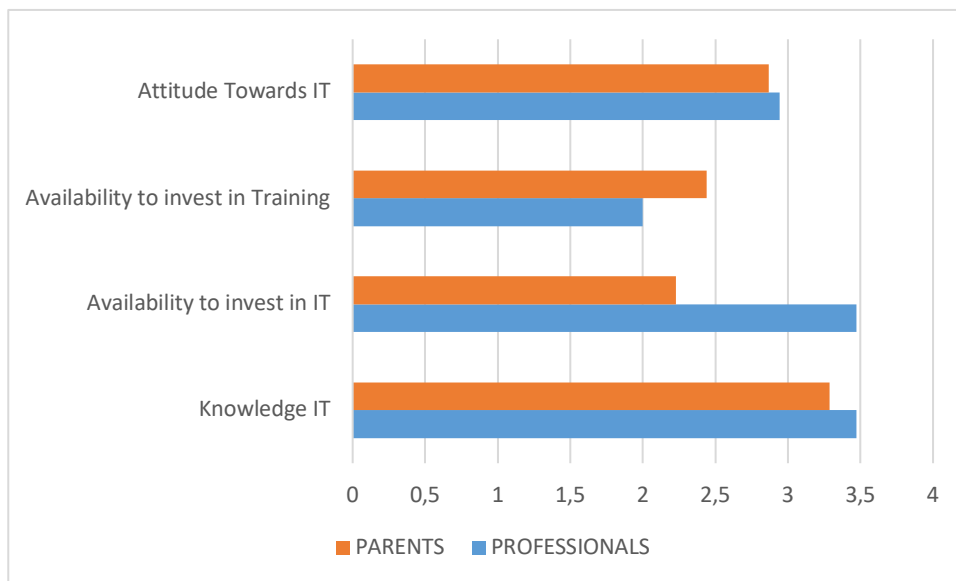


Figure 1. Comparison in the measures between parents and professionals in the Spanish sample

We have seen the information about the group. However, this information is considered by the app for each individual with ASD, parent and professional, in order to calculate recommendations together with the results of the 12 interactive tests that evaluate the skills of the individual.

For the purpose of this document, we focus on the group information as it is more representative of the sample and of the actions of the App. Now we can see what the app recommended for this group of people with autism, their parents and professionals. The app recommended an average of 51 Apps for each participant (with a standard deviation of 20,75). The following figure shows the average distribution of Apps recommendations per category (Communication, Calendars, Step by Step, Music, Games, Timers, Education and Emotions). Parents and teachers were asked about their priorities about these categories (saying whether or not each

category was a priority for intervention for the child). They coincided in an average of 4,47 categories (with a standard deviation of 2,05).

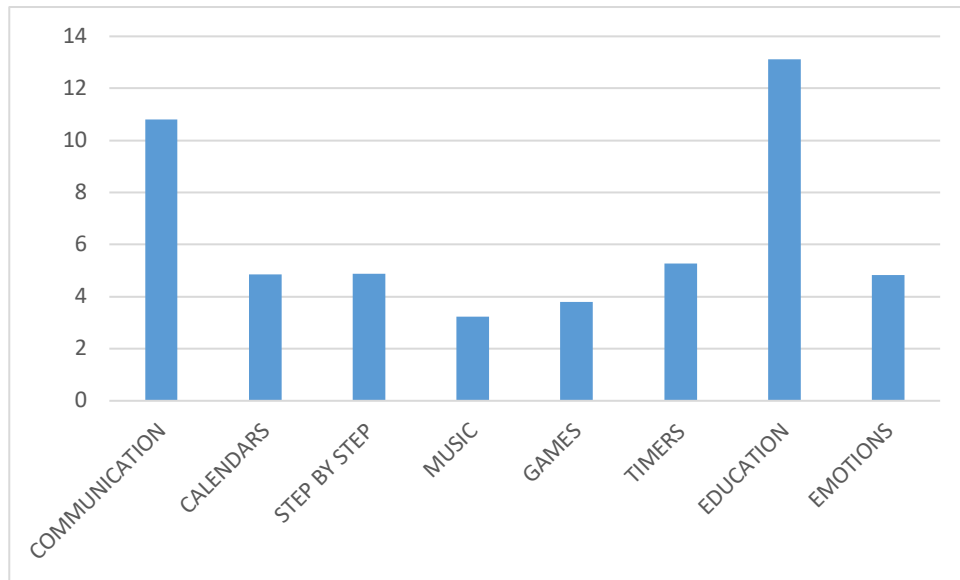


Figure 2. Average of apps recommendations per category in the Spanish sample.

How expert teachers value these recommendations

After completing all the interviews with parents and teachers and running the interactive tests with students with ASD and ID, the SMART-ASD App provided a set of recommendations as it was mentioned about. Expert teachers were asked to analyze the set of recommendations provided for each child and to evaluate their suitability for the individual needs. Then they were asked to score, per category, the appropriateness of each specific set of recommendations for each child. As they knew very well the individual with autism as well as the parents and professionals working with them, and they also had studied the possibilities of the Apps being recommended by SMART-ASD, their opinion were considered very important to see if the recommendations made sense. The following questions were asked for every category for which SMART-ASD App recommends apps:

- Were the recommendations of this category appropriate for the particular individual with autism for whom they are recommended?
- Was the order of the list the right one (did the most appropriate ones appeared in the firsts position of the ranking?)

This figure summarizes the findings regarding the first question, were ‘Communicator’, ‘Calendar’ and ‘Education’ got the best scores and ‘Emotions’ the lowest. It is also significant the higher standard deviation that is shown in the scores given by the Spanish participants, in comparison with those from the Turkish participants.

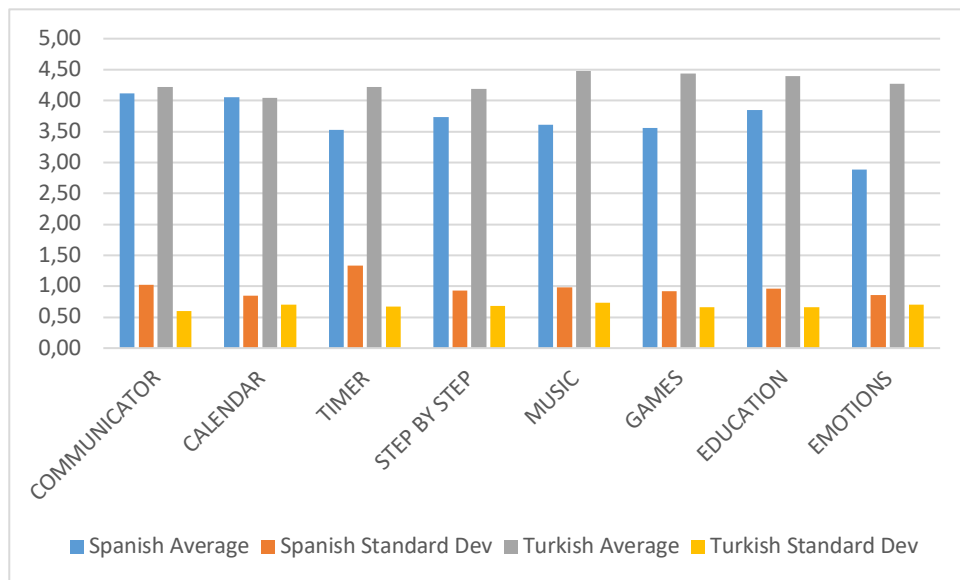


Figure 3. Were the recommendations appropriate? (0-5)

As for the second question, as it can be seen in the next figure, the distribution of the answers of Turkish teachers were very similar for all categories, with much higher variation for the Spanish ones, were the categories ‘Communicator’, ‘Timer’ and ‘Emotions’ got lower scores than other categories.

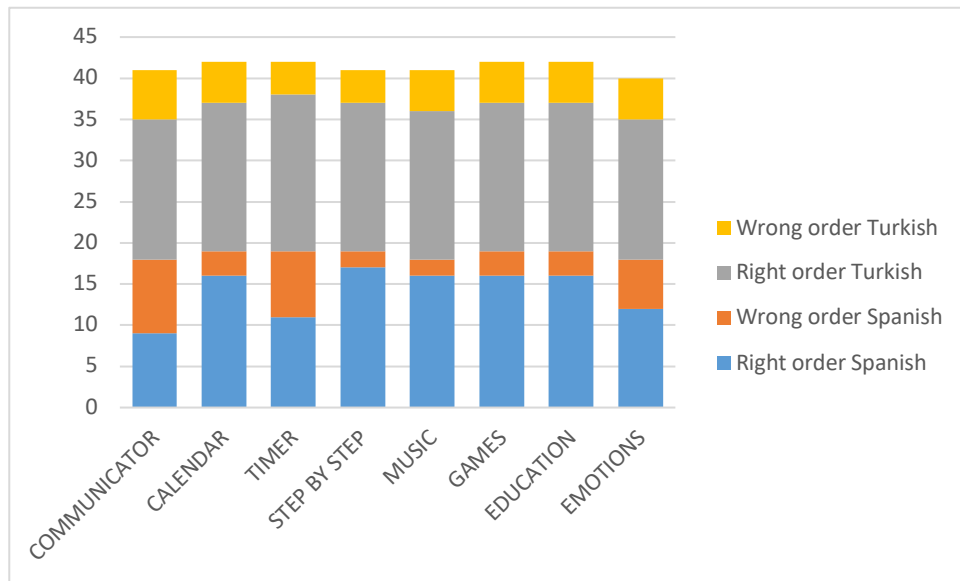


Figure 4. Were the recommendations order right or wrong?

This information serves to improve the rules that articulate recommendations from the information provided by parents and professionals through the interviews and the data captured from the student with autism throughout the interactive tests. Going into detail when analyzing this information will help developers to adjust the weights of the different variables reflected in the rules that calculate recommendations, in order to fine tune the functioning, especially when accompanied by the proper order in which recommendations should be given. Within that framework, the SMART-ASD recommendation system will improve over time.

But expert opinions are only one source of information about the appropriateness of the recommendations. The other source will come from the results of the medium-term study designed and implemented in order to gather data about the impact of the Apps recommended and incorporated into an individual plan, over a long period. For that purpose, the Study 2 was designed. The next section explains the experimental design developed



STUDY 2. Evaluating App effectiveness in the medium term

Research question and dependent variables

The following is the main question to be answered with this research: “Does SMART ASD app contribute to the individuals with ASD and parents/teachers’ satisfaction and dedicated time when using recommended technology?”. This can be broken down into the following variables:

1. The degree and satisfaction of use of technology by the individual with ASD:
 - a. Number of apps used
 - b. Time dedicated to its use
 - c. User satisfaction with the apps being used
2. The degree of support for using technology provided by the surrounding people:
 - a. By parents
 - i. Knowledge and beliefs of IT usefulness for ASD
 - ii. Economic (% of their available budget) and Time availability for IT for their child
 - iii. Time dedicated to personalise apps or other technology
 - iv. Time dedicated to accompany the person with ASD when using that technology
 - v. Parent satisfaction with the apps being used
 - b. By practitioners/teachers
 - i. Knowledge and beliefs of IT usefulness for ASD
 - ii. Time availability for IT for their student
 - iii. Time dedicated to personalise apps or other technology
 - iv. Time dedicated to accompany the person with ASD when using that technology
 - v. Practitioner/teacher satisfaction with the apps being used

Research Model

In order to collect the data of this study, pre-test post-test controlled grouped randomized pattern model was used from experimental research models. According to this model, first of all in research process experimental and control groups are defined from the experimental subject pool which consists of all detected children with ASD in schools in Konya city center. Before the application, the measurements of the dependent variables of the subjects in both groups are taken. In the application process, while the experimental process the effect of which is tested is given to the experimental group nothing is given for control group (Büyüköztürk, Çakmak, Akgün, Karadeniz ve Demirel, 2015). At the end of the study, the measures of the dependent variables

of the subjects in the group are measured with the same instrument; the measurement results of the dependent variable of the experimental and control groups are compared using appropriate techniques in order to see the effect of the experimental process. In this research, after the concept and competences that students with ASD will use technology are evaluated, the most suitable applications are defined for child and it is aimed to investigate effectivity of the applications which are submitted via tablet PCs.

Research design has been shown in the table below.

Table 3. Steps of Study 2

	Pre-Test			Experimental Process (6 Months)			Post-Test		
	Student	Teacher	Parent	Student	Teacher	Parent	Student	Teacher	Parent
Experimental Group	SMART-ASD	-	-	Suggested App	Mooc	Mooc	SMART-ASD		
Control Group	SMART-ASD	-	-	-	-	-	SMART-ASD		

Experimental Application

Experimental Application has been realized in given steps below;

1. Informing parents and teachers of children with ASD in control and experimental group about the SMART-ASD application and process
2. Students in experimental and control group;
 - a. With SMART-ASD app defining student's tablet using performance and education needs.
 - b. With SMART-ASD app implementing pre-tests
3. Experimental group;
 - a. Student's studying on smart applications such as communicators, timers, entertainment, developing free time skills suggested by SMART-ASD app for students with ASD (6 Months)
 - b. Mooc training for the teachers of students with ASD
 - c. Mooc training for the parents of students with ASD
4. Experimental and Control group students;



- a. Defining student's tablet using performance and education needs with SMART-ASD app
- b. With the SMART-ASD application, gathering data on the use of SMART-ASD recommended programs by the students in the experimental group

In the Spanish sample, in order to uniform the level of knowledge of both groups, all the teachers and parents from experimental and control group had to receive the MOOC training and pass the exams of the MOOC to become part of the sample.

Data Collection Tool

The first step in using the SMART-ASD application is to collect information about the person being assessed. The information on the tablet computer includes the name, date of birth, gender, photograph, favorite music of the evaluated child and finally the person to be interviewed (mother, father, educator, professional) is added (with a photo). Later, interviews were held with family member and teachers, and responses were recorded by marking the most appropriate options on the i-pad.

There are 12 tests on the tablet computer to evaluate children with ASD. Each test begins with instructions for the things to be done. The process begins by giving the tablet P.C to the child. Adult (either a family member or teacher) has already ensured the control whether the test has been done successfully or verbal (telling what to do) or physical help (showing what to be done physically) has been given. In order to complete the test, when the given time is over children have given the tablet back to adult. After each test on the tablet PC, the adult has evaluated the performance of the child by using the buttons on the screen. At this stage, if the child performs the activity without any help the button on the top; if the child don't pass the test despite the help second and third buttons must be slided. It is noted that if the child passes the test with physical and verbal support, the entire three buttons should be slided. After the test was evaluated by the adult, the next step was passed. 12 tests were made according to this order. If the test was invalid for any reason, it was made from the beginning again. For each test, an adult (parent, teacher, professional) marked on the app whether the test was successfully completed, any physical or verbal help was given or not. Each test was finalized to recommend applications that would be appropriate for the child. Before the experiment, this procedure was applied to the students in the experimental and control groups respectively and apps suitable for children were defined. Then,



together with children in experimental group recommended applications were studied during 12 weeks via tablet computers.

In schools where students in control group nothing has been done in scope of this project. At the end of the process SMART-ASD app which was used as pre-test activity at the beginning, was used as last-test in both groups.

In this research IOS tablet PCs were used. The software that can operate in iOS/Android tablets was developed to be used in this research as one of the intellectual output of the project and this software was used during the application process. There are four parts in this application. 12 tests that have been used for the evaluation of the children with ASD. Test consists of implementation phases such as: turn on the App, move the things on the screen, touching the screen, touching the big button, touching the small button, sliding, keeping the screen in balance, volume control, desktop navigation, labyrinth, cam, general application. Second part consists of interviews with parents and teachers to see general knowledge about technology usage of the child, parents and teachers. The third part is for receiving the evaluation results and fourth part is for monitoring and final evaluation.

The developed app was uploaded to the tablet PC. There is an icon on the left top corner of the screen that will be used to add a new person. In opening information page when the screen is clicked the key board is seen and names are written on necessary part. Then date of birth and gender of the evaluated person is chosen. In an optional way either a photo of the child or a photo from the gallery is used to. The song that the child likes or a song from the play list can be added to be used in application process. In second phase details of the person to be interviewed (mother, father, trainer, professional etc.) is chosen and his/her details, mail address and photo (optional) are added. User settings are completed by an adult. (exp. Teacher, a parent or professional)

Each test that was be used to evaluate technology using performance of the child begins with an instruction that describes what to be done. The test starts by giving the tablet to the child. Each test phase has a time limited to be completed by experimental subject. Before the allocated time for one test is not finished, it is not



possible to pass to another test. After allocated time is over 3 bip sound is heard. It means that Tablet must be given to implementer, in addition to the bip sounds a visual is seen on the screen. Adult touch the screen to pass next activity and evaluate child's performance at the end of each test by sliding the three buttons that are seen on the screen to the right. At the beginning all the buttons are no option. Implementer can slide the buttons that state whether the child has received support or not or what kind of support he received during the implementation phase of the test. After the test is evaluated by the implementer, in order to pass to next step blue X symbol on the top right corner. 12 tests are applied in this order. In case of a situation that cause test is invalid, there is the chance of applying the test once again.

The other parts consist of interviews towards parents/someone who knows the child very well and teachers/educators to understand in which scope the child is able to use the technology. With the help of the interviews with teachers or educators, their views have been received on capacity development level (communication, cognitive, arranging needs) towards technology usage in the training of the children with ASD and with the questions about possessed and used technologies education needs of these children and skills that needs to be developed. In a similar way, from one of the parents or a person who knows the child very well their views have been received on; their closeness to the child with ASD, their technology usage, autistic child and technology, economical convenience, autistic child and his life quality. The questions on these interviews to understand the concept of the technology usage can be save by choosing the most appropriate one/ones among the options.

Intervention

Before gathering the research data, implementation process has been introduced to both parents and teachers by organizing information meetings about usage the software. In defined implementation schools the designed software was applied children in both experimental and control groups. All implementations were applied by researchers with the company of the teacher of the child with ASD. Also views of the parents and teachers were saved to the tablet PC. Pre-test implementations were completed within 20 days.



Then all the participants received the recommendations about the apps to be incorporated into the daily life of the individual with autism during the next 6 months (within the school academic year). Teachers and parents analyzed the recommendation together and, with the help of SMART-ASD App, they decided what apps to incorporate into a plan and who was going to be responsible of each task within that plan (acquiring the app, installing the app, setting up the configuration, accompany the student when using the app, and so on). Once this period has been completed, then parents and professionals will have to use again SMART-ASD for the follow-up. This includes using the 'follow-up' section of the App and also duplicating each student case within the app and repeating the interviews made at the baseline together with some additional tests.

By doing it this way, we will be able to see if there were changes in the variables that were initially measured in relation to the context of the child (knowledge about technology, availability to invest time and money in technology, availability to invest time and money in learning new skills related to technology for autism and attitude towards technology), as well as the changes in the child skills when using the tablet (by repeating the 12 tests after the intervention period), as well as the impact of using the recommended apps during the 6 months period (on the follow-up section of SMART-ASD App).

CONCLUSION

The reduction of project length from the originally planned 36 months to 24 months has introduced important restraints in the research, as the time available had a reduction worthy of consideration. The available time was enough for research designs such as the one of Study 1 but not for a mid-term study such as the Study 2. However, Study 1 has produced important outcomes that have allowed the improvement and fine-tuning of the SMART-ASD App, that is publically available in iOS and Android versions. The research design developed for Study 2, once the 6 month period of intervention has expired, will provide additional data that will allow a better understanding of the value of the recommendations provided by the SMART-ASD App and about the impact of the selected apps into the daily life of the individual with ASD, his/her parents and teachers.



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Annex 1. MİLLÎ EĞİTİM BAKANLIĞI Evaluation Sheet

FORM FOR DETERMINING THE PERFORMANCE OF PERSONS WHO PERVASIVE DEVELOPMENTAL DISORDERS

Surname	Name	ID NUMBER	DATE OF BIRTH

MODULES	EVALUATIONS							
Matching Skills	1.	2.	3.	4.	5.	6.	7.	8.
1. Matches co-object with co-object								
2. Matches co-object with the Picture of co-object								
3. Matches the same coloured objects among the assorted coloured and assorted								
4. Matches the same coloured objects among the different coloured and shaped								
5. Matches the same shaped objects among the same coloured and shaped but								
6. Matches the same figures among the different shapes and coloured ones.								
7. Matches the co-object image with the co-object image								
8. Matches the non co-objects within the same class.								
9. Matches the non co-images within the same class								
10. Matches the non matching pictures with the objects within the same class.								

Imitation Skills	1.	2.	3.	4.	5.	6.	7.	8.
1. Imitate gross motor skills.								
2. İnce motor becerileri taklit eder. Imitate fine motor skills								
3. Imitate the facial mimic expressions.								
4. Imitate the two stepped motor skills								
5. Imitate the three stepped motor skills								
6. Imitate the group mimics in accordance with rules								
7. Imitate the vowel and consonant sounds.								
8. Imitate the syllables								
9. Imitate the environmental sounds.								
10. Imitates low and high tones								
11. Imitates words.								
12. Imitates objects using gestures and words								
13. Imitates sentences								
14. Creates sentences from words.								
15. Uses sentences in activities.								

Instruction Pursuit Skills	1.	2.	3.	4.	5.	6.	7.	8.
1. Performs simple instructions that states one action								
2. Performs instructions that states two actions								
3. Performs instructions that states three or more that three actions.								
4. Performs conditional instructions.								
5. İstene nesneyi bulur. Finds the desired objects.								
6. Brings the desired objects								
7. Goes to a certain place when she/he is directed.								
8. Performs the set of instructions that tells a single action.								
9. Performs the set of instructions that states two or more actions.								



Using Visual Aids Supports	1.	2.	3.	4.	5.	6.	7.	8.
1.For monitoring the daily routine; uses the event timeline.								
2.Uses the activity schedule for social interaction.								
3.Uses the activity schedule for peer interaction.								
4. Uses the activity schedule for physical education								
5.Uses the activity schedule for self-care skills.								
6.Uses the activity schedule for game skills.								
7.Uses the event schedule for daily living skills.								
8.Uses visual event schedule for arts skills.								
9.Uses visual plan intended before and after correlation.								
10..Uses the part devoted to user according to the event schedule.								
11.Uses goods and vehicles carrying its own color code..								
Receptive Language Skills	1.	2.	3.	4.	5.	6.	7.	8.
1.Directs her/his attention to the speaker.								
2.Manifests with her/his gestures and mimics that she/she is listening to the speaker								
3.Distinguishes objects.								
4. Distinguish the actions.								
5.Dramatizes the actions								
6.Distinguishes the objects according to their category.								
7.Distinguish objects according to their features.								
8.Distunguishes the objects according to their functions.								
9.Distinguishes people.								
10.Sequence the events according to the order of occurrence.								
11..Shows the not happening								
12.distinguishes sounds.								
Expressive Language Skills	1.	2.	3.	4.	5.	6.	7.	8.
1. Answers to questions.								
2.Names the action or the image of the action								
3.Introduces her/his family.								
4. Establishes meaningful sentences in conversation.								
5.Talks about a specified topic.								
6. Identifies objects.								
7.Tells the events according to the order of occurrence								
8.Uses words indicating place.								
9.T ve sahiplik bil Use singular and plural personal pronouns and possessive								
10. Uses sentence patterns.								
11.Uses phrases correctly.								
12.Asks questions								
13..Reacts fort he broken devices and materials.								
14. Describes past events.								
15.Uses antonyms.								
16.Tells unknown/non-exist								



Games and Music Skills	1.	2.	3.	4.	5.	6.	7.	8.
1. Establishes relation with part and the figure/shape								
2..Establishes relation with part and whole/entire								
3. Imitates/mimics a fictional game								
4.Plays simple games.								
5..Plays symbolic games								
6..Plays games needs cooperation.								
7. Interact with peers while playing the games								
8.Talks about the materyals and the games that she/he is playing.								
9..Makes simple rhythm movements.								
10..Acts appropriately with music								
11..Holds rhythms appropriate with music								
12..Sings simple songs.								
13..Sing songs with a group								
14..Accompanies games with simple music.								
15.Recognizes the major musical instruments.								
16.Recognizes the musical instruments with their sounds.								
17.Sounds the melodies using the sound and the instrument.								
18..Separates the bass and fine sounds								
19.Plays individual games with music.								
20..Plays group games with music.								



Self-Care Skills	1.	2.	3.	4.	5.	6.	7.	8.
1..She/he can go to toilet alone								
2.She/he can hats off.								
3. She/he can hats on.								
4.. She/he can scarf off.								
5. She/he can scarf on.								
6. She/he can gloves off.								
7.Eldiven giyer. She/he can gloves on.								
8. She/he can skirt off.								
9.She/he can skirt on.								
10.. She/he can pants off.								
11.She/he can pants on.								
12. She/he can pullover/sweater off.								
13. She/he can pullover/sweater on.								
14. She/he can dress off.								
15.El bise giyer. She/he can dress on.								
16. She/he can coat off.								
17. She/he can coat on.								
18. She/he can jacket off.								
19. She/he can jacket on.								
20. She/he can Socket socks off.								
21. She/he can Socket socks on.								
22. She/he can pantyhose off								
23. She/he can pantyhose on.								
24. She/he can shoes off.								
25. She/he can shoes on.								
26.. She/he can snap fastener off.								
27. She/he can snap fastener on.								
28.. She/he can zip off.								
29. She/he can zip on.								
30. She/he can button off.								
31.. She/he can button on.								
32. She/he can belt off								
33.. She/he can belt on.								
34.. She/he can bra off.								
35.. She/he can bra on.								
36. She/he can eat by hand.								
37. She/he can drink from a glass/ cup.								
38.uses pipette.								
39.Eats with a spoon.								
40.Eats with a fork.								
41.Eats using the spoon and the fork at the same time								
42.Washes hands.								
43.Dries hands								
44..Washes face.								
45..Dries face.								
46. Uses wet wipes to clean her/his nose..								
47..Washes feet.								
48.Dries feet.								
49Combs hair								
50..Brushes teeth.								
51..Cuts nails.								
52.Shaves beard..								
53..She can change pad.								
54..Has bath/takes shower.								
55She/he can do the body hair removal.								



Daily Living Skills	1.	2.	3.	4.	5.	6.	7.	8.
1. Prepares food/meals.								
2. Chopes the food using knife.								
3..Slices the food using knife.								
4.Uses stove.								
5..Uses mixer.								
6.Uses toaster.								
7..Uses oven								
8..Prepares drinks								
9..Does wash up after the meal..								
10.Cleans the kitchen counter.								
11. Sets the dinner table.								
12. Cleans the dinner table								
13.Serves the meal to the dishes.								
14..Serves the drinks to the glasses								
15..Empties dishwasher.								
16..Puts the dirty dishes into the dishwasher								
17. Tidies up bed.								
18..Dusts the furniture								
19.Wipes the ground								
20. Cleans the basin								
21..Separates dirty laundry.								
22.Throw the dirty things into appropriate palces								
23..Does laundry washing by hand								
24.Uses washing machine.								
25..Hangs washed clothes.								
26..Picks up dried clothes								
27..Folds dried clothes.								
28..Places dried clothes								
29..Places objects in the room correctly.								
30. Hangs her/his personal belongings/clothes.								
31..Places her/his clothes into the wardrobe								
32..Uses vacuum cleaner.								
33.Switch on/off TV.								
34..Uses telephone.								
35..Turn on/off radio								
36..Uses tape recorder.								
37.Saç.Uses hair drier.								
38..Sets alarm clock.								
39.Opens door by key.								
40. Locks door by key.								
41..Uses lift.								
42..Does ironing.								
43..Polishes shoes								
44..Uses camera to take photos.								
45..Uses photocopy machine.								
46..Does shopping.								
47..Uses public transportation.								
48.Follow the rules in public places in society.								