Research Article

EmbrASD: Android Mobile Application for Children with Autism as a Supplemental Tool for Therapy

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ABSTRACT

Autism has a very wide range that influences people, specifically children in general. Usually, it affects a child's social interaction, communication, behaviors, and interests. Providing a complete device for treatment which is planned to be used by kids with autism needs to be taken into consideration. There is no software available that will adhere to the main areas of autism. The development a multidimensional software that focuses the main areas of kids with autism was a specific goal that the paper is being addressed. It is planned from the viewpoint of several specialists: more particularly speech therapist, occupational therapist, Special Education (SPED) educator and an Applied Behavior Analysis (ABA) specialist. The specialists' focused objectives were lengthily included into the planning of the software. The development of an application for the young with autism that would completely attend to all the main areas that are initiated by autism and serves as an addendum to treatment is the primary goal of the study. Interviews from, speech therapist, occupational therapist, SPED teacher, ABA therapist and a SPED therapist will serve as a basis and the prototyping methodology for system development. With the implemented system, the intended users gave an approval on the application to be integrated in the teaching of children with autism. Suggestions on the improvement of the application comprises of including video recording for API 22, implementing the system in the iOS environment, and concentration on older autism cases were recommended.

Keywords: SPED, ABA, occupational therapy, autism, mobile application, speech therapy

Introduction

Autism encompasses a wide range that affects children in an unexpected way. These side effects will appear within the child's interaction

with others, verbal, and nonverbal communication and finally the interface and abnormal behaviors of the child. Since each case of autism is one of a kind, the application ought to be

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custom fitted to a child's specific need. There must be multidimensional, well-defined, and structured learning destinations to take full advantage the learning value of children.

Numerous applications are available that adapt towards kids with autism in any case these systems are not truly planned from the viewpoint of specialists. The activities and exercises being presented in these applications are not showing cohesiveness and needs to be in a multidimensional approach. Children with autism are effortlessly occupied and will easily get tired of the activities and exercises within the application. Specialists see the strategies of how to instruct young ones how to improve their lexicon, to act legitimately, to take commands and how to read and write.

Although there are applications as of now accessible that aim to target the main areas that are initiated by autism, there is none accessible that completely targets all areas. Moreover, available applications are not multidimensional. There are limited to no games that are outlined for children with autism but do have satisfying benefits to the child.

Right now, recreations and application will ordinarily have as it were a simple, one-dimensional approach within the game plan. The games ought to have a particular aim and objective that can be assessed and evaluated for the parent and specialist to gage the movement of the child's learning. There must be a extensive assortment of fun activities as well as exercises for parents to check in an application. A child may not utilize it after a few times in case the amusement gets to be dull. As the child ace every ability, another level of complexity will consolidate the past abilities and show modern combined challenges that would need the past ability and the unused aptitude being displayed.

Particularly, available applications may target one area and not combine the helpful procedures of an Applied Behavior Analysis (ABA), SPED, Occupational and Speech Specialists. Logging the child's reactions to every lesson is additionally missing. The time went through on the application ought to complement the therapy the child undergoes in treatment sessions. The progress of difficulty ought to be planned with prerequisites, the arrangement of which is

colors and shapes, letters and numbers, consonant-vowel-consonant formulation and locate words, descriptive words, basic sentences and finally perusing comprehension.

Since specialists are the ones who are able to treat autism, the therapists ought to have a coordinate association within the planning of the application on development. With the wide range of areas that are influenced by autism, inputs from those specialists particularly an occupational therapist, speech pathologist, and a SPED instructor, their ability will greatly assist the learning of a child since the therapists can customized the learning targets when planning the development of the application.

Methods

The result of the conducted study through its design was inferred through a arrangement of interviews of individuals specifically included in the development of one of the researcher's son who was autism. These individuals are associated in the treatment scene where the child is as of now enlisted and experienced sessions were the Speech Therapist, Occupational Therapist, SPED Teacher, ABA Therapist and the Special Education (SPED) Therapist. The suggestions in the development, particular objectives and learning goals were fundamental within the developed application which is a supplemental instrument for therapy. The results of the interviews prompted the development of the system through a prototyping methodology with consultations from the target users to come up with a finalized application.

The application was planned to have five modules or lesson types and selections were done using swipe motions. The lesson and the choices produced were arbitrary. This would avoid the child learner to basically memorize the answers. At the conclusion of the topic or lesson, the application requires the child to articulate the lesson and the sound coming from the child is recorded in the application.

The child interacts with the objects by touching and dragging these into the right area indicated in the application. It has changing degrees of complexity as the child advances within the levels. At the conclusion of each action, the youngster may select to advance to

another level or select another activity. The child actions will be chronicled on each stage to show advancement.

When child advances, the parent can gage how long the learner plays on an action by investigating the sound clips in every completed stage. The parent at that point will be able to gage the child's regions of qualities and shortcomings. The results can be communicated to the therapist that it can gage what range of improvement ought to tend to since the kid's reaction is logged in each lesson. Each lesson and the choice of answers is presented in random to guarantee the child will not just memorize the answers.

A demo will be conducted with the intended audience to determine the agreeableness and sufficient functionalities of the application. This was done for the implementation and integration of the application to the structure of teaching children with autism.

Results and Discussion

EmbrASD records the child's reactions to the exercises, so that advancement will be observed. This can be vital since children are just spending a short amount of session therapy time. In this manner, parents and therapists can closely screen the one's advancement. Basically, the main focus of the application are on the main areas influenced by autism including language and communication, social aptitudes, cognitive thinking, communication, imitation, reading, motor skills and comprehension.

The following menu screens are screenshots from the portable application relating to its appropriateness in therapy:

Figure 1. Colors and Shapes Menu Screen

Figure 2. Letters and Numbers Menu Screen

Figure 3. CVC and Sight Words Menu Screen

Figure 4. Abstract Words in Simple Sentences Menu Screen

Figure 5. Reading Comprehension Menu Screen

Throughout all the menu screens for figures 1-5 illustrated the topics specified in each. Pressing the buttons located in the middle of the screen, it opens the specific lesson type (e.g. Colors and Shapes for Figure 1). Swiping either going to the left or right changes the menu screen to the next one (e.g. Colors and Shapes going to Letters and Numbers).

The following lesson screens gave an illustration on the mechanisms within the lesson delivery to children with autism.

Figure 6. Colors and Shapes Lesson Screen

Figure 7. Letters and Numbers Lesson Screen

Figure 8. CVC and Sight Words Lesson Screen

Figure 9. Abstract Words in Simple Sentences Screen

Figure 10. Reading Comprehension Screen

Figures 6-10 illustrates several topic lessons screen. In each of the screen, the child will get a sound-related signal and the question appearing on the bottom side of the screen. The kid chooses a reply by employing a drag and drop motion, the image will drop on the brown box located on the screen at the bottom side. The top left button of the application brings back the menu choice screen. The top right button on the screen will create a new lesson that is randomized in the application. The foundation on each of the activity is a video as it were if the gadget has an API level 16 or better, or else it will only show an ordinary gray background.

Finally, the following recording screens shows an illustration of obtaining chronicles on the child's activity.

Figure 11. Colors and Shapes Audio Recording Screen

Figure 12. Letters and Numbers Recording Screen

Figure 13. CVC and Sight Words Recording Screen

Figure 14. Abstract Words in Simple Sentences Recording Screen

Figure 15. Reading Comprehension Recording Screen

Figures 11-15 illustrates audio recording screen for each of the topic. The child obtains a sound-related prompt on what to speak and the application will consequently record the sound for ten seconds. The input in screen touching is disabled while the recording is ongoing. The top left button of the application brings back the menu choice screen. The top right button on the screen will create a new lesson that is randomized in the application. Same with previous set of figures, the background on this action is a video but as it were in the event that the gadget used has an API level 16 or better, or else it will only show an ordinary gray background.

Since testing was a particularly important element in the prototyping methodology, a series of tests were made to validate the integrity of the application. Usage of video recording and playback were removed to ensure a wide coverage due to limitations to the technology that prospective users will be utilizing.

Conclusion

Based on the study, the researchers effectively and successfully created a software planned for a child with autism that is utilized as a supplement for sessions in therapy. The multidimensional approach of focusing on main areas of kids with autism will incredibly upgrade and assist sessions. A child's audio recordings can be played back and subsequently be analyzed by therapists and parents.

Results of the study shows that the software application has focused on mitigating the main areas of a child with autism. Each of the module trains and empowers the child to talk, memorize, think, analyze, and comprehend the lesson given. Moreover, the software application encompasses a multidimensional approach on the presentation of the child's lesson plans. Inputs from ABA therapists, speech therapists, instructors under SPED, as well as occupational therapists incredibly impact the plan, lessons, and structure in the software application. Lastly, the child's audio recording in every lesson can be utilized as a gage if the learner is exceeding expectations and what ranges require enhancements. This will be significant both for parents and therapists since the data shapes and alter the lessons for the learner in both therapy and SPED tutoring.

The demo delivered to the intended venue, the intended audience (therapists and teachers) validated the functionalities as sufficient and will be ready for integration within the curriculum once the full version of the application is deployed.

Future research and development should warrant recommendations that will bring the improvement of the application and more engagement to children with autism. Porting the application to the environment for Apple users (iOS) would empower guardians or parents to moreover benefit in the application as the current concentrates only in an Android environment. Future upgrades ought to incorporate recording video of a child when the availability of API 22 in online or offline sources is at 80% or better. Video recordings can depict the shape of the mouth of a child when talking, including facial expressions can uncover the passionate state of the child when utilizing the software application. Another recommendation would be applying the study to older cases of autism as the approach is different with teens and adults.

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