

Autism Learning Mobile Application

Mohishaa A/P Satiakumar¹, Norliyana Hut¹, Nurul Ain Mohd Rashid¹, Fawwaz Mohd Nasir*¹

¹Centre for Diploma Studies,
Universiti Tun Hussein Onn Malaysia, KM 1, Panchor Road, 84600 Muar, Johor,
MALAYSIA

*Corresponding Author Designation

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Abstract: Autism is a subset of Autism Spectrum Disorder (ASD), which may be categorised as developmental problems or intellectual impairments characterised by a lack of mutual social engagement, social expression, and social inventiveness. This project aims to develop a smartphone learning application for autism kids aged seven to eight because they are about to venture into much more self-care skills in their daily life. The method used for development is the Iterative Waterfall Model, which is an extension of the traditional Waterfall model. The ability to swiftly adjust to the changing needs of both the job and the demand of the clients is the most significant benefit of the iterative model. The Abstract for this project will be focussed on the development and testing of *AutiVid*. Testing was carried out with Autistic participants to get more feedback to improve the mobile application. The development operation will be done by extending the modules and the activities. Upcoming final year students can extend this application by providing more languages such as Tamil and Mandrin so that the application will be more useful for the autism kids.

Keywords: Mobile Apps, Education Apps, Iterative Waterfall Model

1. Introduction

Autism is best defined as a group of disorders with variable degrees of symptom severity, age of onset, and connections to other conditions (e.g., mental retardation, specific language delay, epilepsy). Autism shows itself in diverse ways in different children and in the same child throughout time. Even while there are substantial and persistent commonalities, particularly in social impairments, there is no one behaviour that is consistently associated with autism, and no single behaviour that would automatically rule out a child from receiving an autism diagnosis. According to a research by the Malaysian Ministry of Health on the use of the Modified Checklist for Autism in Toddlers (M-CHAT) in children aged 18 to 36 months at country health centre, the incidence of ASD in Malaysia is around

*Corresponding author: fawwaz@uthm.edu.my

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1 in 625 children [1]. The number of children referred to paediatricians in Malaysia is increasing, despite the fact that the number of children receiving special needs services quadrupled between 2006 and 2013. Following that, more than half of the parents sought help when they saw changes in their children's behaviour or development defects. Children with autism face innumerable challenges on a daily basis [2]. Parents often struggle to teach their autistic children. The daily routines of children with ASD are carried out by their parents and teachers. Individuals' dependency on parents and others continues to fade as they develop self-care skills, which are one of the life's independence abilities [3].

This project would focus on children with autism as a way to evaluate children who are unable to recognize and use their everyday communication and social talents. Because they are going to embark on considerably more self-care skills in their everyday lives, this research focuses on mild autism children aged seven to eight. To assist and enhance the everyday abilities of children with autism, a variety of educational ideas have been developed [2]. Parents and instructors can use this mobile application as a learning tool to aid them in educating autistic children who require more assistance with the fundamental teaching process. Autism children will be able to learn simple self-care skills to help them with their daily routines with this learning tool. This project seeks to create a smartphone learning application for autistic children that will make it easier for them to do their everyday tasks. Autism Even if technology is still problematic for children with autism, mobile devices are more beneficial than no gadgets [2], children are more attentive to what they have learned from utilizing technologies and are ready to absorb more [3], [4]. The goal of this study is to find appropriate theories that can help autistic children. Aside from that, the initiative aims to provide digital material for autistic children via mobile applications. There are several limits to this project such as the lack of a database, we don't know how many individuals use the AudiVid software. Aside from that, this application includes a limited number of modules and activities that we may expand in the future

2. Literature Review

2.1 Mobile Application for ASD Children

A wide range of technological equipment can be utilised to help children with ASD overcome developmental obstacles [5]. Because mobile devices broaden the learning experience or spectrum at all times and in all places, a suitable instructional experience may be provided to support or promote learning activities outside the classroom. [6]. Furthermore, many ASD youngsters recognize that technology may be motivating, and they devote far more time to technology-based tasks (on average 4.5 hours per day) than to non-technology activities (2.8 hours per day on average) [7]. Technology-based treatments tend to be beneficial since autism is characterized by a desire to remove oneself from social relationships, as well as a preference for technical and formal therapy over biological and social interventions. Digital technologies, for example, are typically more predictable than humans and might provide opportunities for engagement. [8].

2.2 Theories Used to Create Mobile Application

Visual treatment is more effective than auditory stimulation for most persons with ASD [9]. In general, children with ASD thrive in visual abilities but struggle with verbal abilities. Furthermore, behavioural research suggests that atypical attentional deployment is unlikely to explain autism's detailed visual vision, as people with autism have a sharper improvement in visual output around a cued position than people without autism, and have difficulty monitoring multiple moving objects regardless of object speed. [10]. Apart from that, both children with typical development and children on the autism spectrum intuitively map markings to depicted referents from an early age, demonstrating their understanding of pictures as abstract representations and encouraging the application of knowledge to real-world situations [11]. As a result, video modeling and chaining theory are largely used to mobile apps.

2.3 Example of Mobile Application for ASD Children

The time of writing this paper, the “Autism Apps” locator tool listed over 60 autism applications under communication (USA app store)¹, with several of them modeled after PECS. PictureCanTalk, for example, uses the PECS approach to construct sentences using customized communication boards and pictures that speak. After a sentence has been constructed, the audio speak function is activated. The focus focuses on sentence formation and teaching autistic children to "speak" in a structured manner. It has picture catalogs that may be customized to include photos and voices during the setup process. AutiSay takes a similar technique to building its photo library and embedding a personalized voice into each image. AutiSay, on the other hand, focuses on communicating without the usage of words. It employs a more basic version of PECS, in which the user speaks by touching the images directly. The voice in an image is caught during the content setup. At this stage of development, this simplicity allows the child to focus on communicating a need rather than worrying about language structure.

3. Methodology

This project is created using the Iterative Waterfall Model technique, which is an extension of the traditional Waterfall model. This version is quite similar to the traditional version, with the exception that certain adjustments have been made to improve software development efficiency. The Iterative method begins with the developer designing and implementing a piece of the programme, which is then reviewed to establish the remaining specifications. The waterfall model is divided into six stages, discussed as follows.

i. Requirement design

All user needs are identified in this phase, which allows any further steps to be planned without additional user contact until the application is completed. The assumption is that at this point, all parameters can be obtained. As a consequence of this project, researchers performed research for journal papers and publications to evaluate the use of a smartphone application and to acquire information on children with Autism Spectrum Disorder. A survey was sent out via social media to 54 people, and two people were questioned, with the first needing communication skills, self-management skills, hygiene, and work skills, and the second needing self-care, social skills, and safety skills

ii. System design

The first-phase criterion needs are analysed at this stage, and the mobile pages are planned. This suggested system aids in determining device and system requirements as well as defining the overall system architecture. This stage of AutiVid's development will concentrate on the application's user interface. This is an important step since it will make the consumers feel at ease when using the mobile application.

The relationship between AutiVid's users and the use cases is depicted in Figure 1. Users who are activists can join up and pick which languages they want to study first. Users may also select modules, watch movies, and complete activities, while the administrator can review the users' information.

iii. Implementation

Parameters and criteria from earlier phases and generate actual code. An Android version of AutiVid is developed as a prototype. At this point, the user interface, features, and functionalities are built. One of the tools utilised in the creation of AutiVid was Android Studio. Android Studio will be used to create both the interfaces and the code. Android Studio is the official integrated development environment for Android application development (IDE). It is built on the IntelliJ Concept, which is a Java-based software development environment that integrates code editing and developer tools.. Also, we used FlexClip and Canva to edit the images and edit the videos that are incorporated into the app.

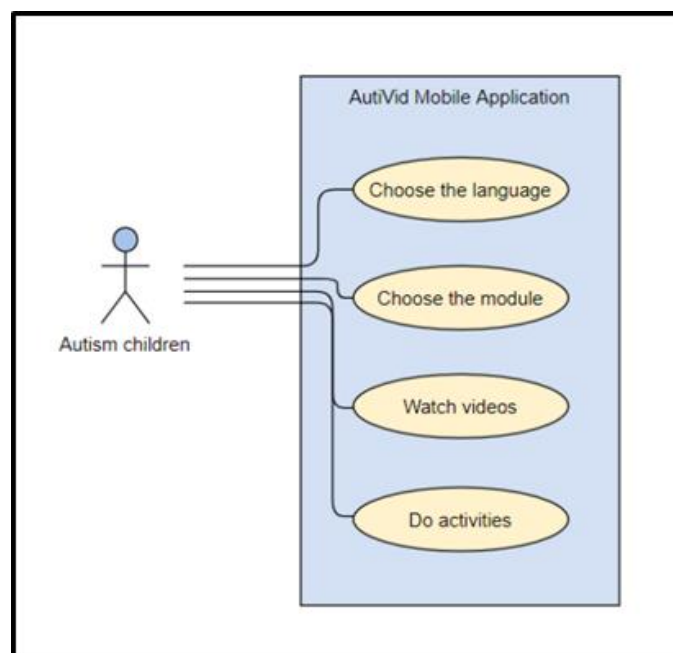


Figure 1: Use Case Diagram

iv. Usability Testing

This stage is extremely important since quality assurance, unit, device, and beta testing are used to identify flaws that need to be fixed. Debugging might be forced at the programming stage as a result of this. Even if the machine fails the tests, the waterfall continues. The mobile application was examined by autistic children using AutiVid during usability testing. We also utilized the Google Form to do usability testing.

v. Deployment

The item is deployed or introduced to the market in the consumer region when testing is done. The mobile application for AutiVid will be released on the Google Play Store so that people may test it out and provide feedback.

vi. Maintenance

During the maintenance phase, the user often utilizes the product regularly, identifying bugs, inadequate functionality, and other errors that occurred during development. When necessary, the development team makes adjustments until the customer is satisfied. In the case of AutiVid, the

application will be modified based on respondent's feedback from the usability test. Depending on the demand for the apps, more features and functionalities may be introduced in the future.

4. Results and Discussion

In this section, we have made the survey we did testing for this application that we developed by giving a Google Form so that our target users can feel the efficiency of this application by trying it themselves and also ensure that the objectives by developing this application can be achieved.

Based on the survey that we do by using Google Form a total of 9 respondents. **Figure 2** shows the autism kids' ages that test and use this application. Because AutoVid's goal is to evaluate usability, the ages for this programme are limited to seven and eight years old. Two five-year-olds, three six-year-olds, and four more seven-year-olds consisting of 7 boys and 2 girls. This application also can be used for normal kid's how to do things properly in daily life. We argue that all parents should take serious time for academic they children also basic routine that Autism kids can learn just using the application and stay at home. Also, they can bring anywhere that they like.

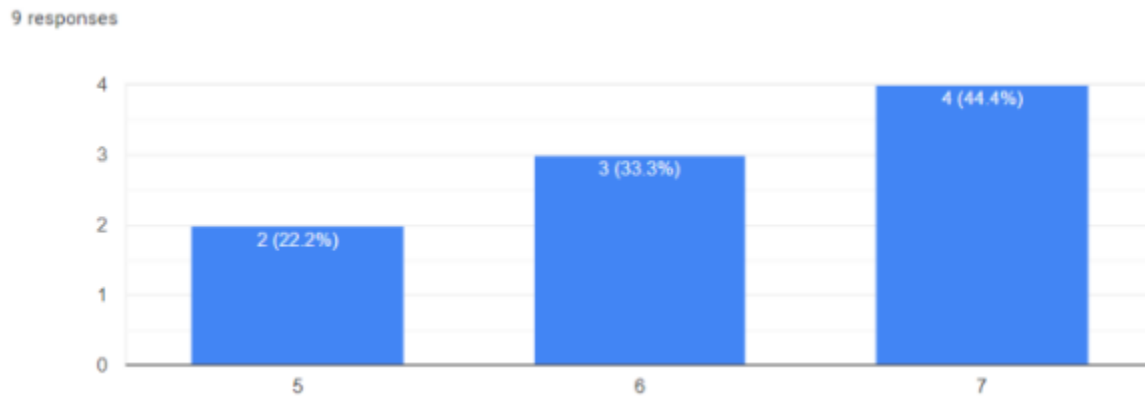


Figure 2: Respondents Age

Figure 2 shows respondents age survey 22.2% that consist of 2 kids of respondents are restricted five years old, 33.3% that consist of 3 kids of respondents are restricted six years old and 44.4% that consist of 4 kids of respondents are restricted seven years old.

Table 1: Usability Test Questions

Question	Response (%)		
	Yes	No	Maybe
1. Were your kid enjoyed AudiVid Mobile Application?	100	0	0
2. Are you satisfied with the AudiVid Mobile Application?	100	0	0
3. Were everything readable on the app?	88.9	11.1	0
4. Were the colours of the application comforting?	100	0	0
5. Were you able to find the information you are looking for?	55.6	0	44.4
6. Was the application working fast enough according to you?	88.9	0	11.1
7. Do you find the way the application is constructed too complex?	44.4	33.3	22.2
8. Do you think the application is useful to your autism kid?	100	0	0
9. Does your kid learn some daily living skills from the application?	100	0	0
10. Will you continue to use this application?	100	0	0
11. Will you suggest this application to your friends?	100	0	0

Based on question 1 the autism kids enjoy 100% by using AutoVid's a mobile application. We have also created this AutoVid Mobile application for autism ease of use for example with button size, videos provided clearly, and also clear letters that they can use. While for result question number 2 the autism kids are 100% satisfied with the AutoVid Mobile Application all kids that are testing this application are satisfied with the mobile application. In question number 3, 88.9% of respondents voted yes while 11.1% voted no for the AutoVid is readable to use.

Next, question number 4 all the respondents vote yes because the colour used in AutoVid Mobile Application is comforting. We have chosen the appropriate colour to develop this application because to attract Autism kids to use this application that's why we choose cheerful and appropriate colours. In the proposal our target is an autism kid's estimated age in seven years and eight years to learn to do something right in everyday life. Based on question number 5, 55.6% of respondents voted yes while 44.4% voted because the user is not sure to find all the information that they were looking for. For question number 6 just 88.9% respondents voted yes while 11.1% maybe the application is working fast enough. The following result indicates that the application is organised too complicated, as 22.2% believe that it is not too difficult, but 33.3% of one participant feels that it is a bit complex because there are more video stages. While 44.4% agreed that the structure of the application is complex. Next, question 8 asks whether the parents of autistic children believe AutoVid is beneficial to their children. This programme is really beneficial for their children, according to all responders, who are parents. According to the results of the Google form for question number 9, respondents say that this mobile application taught their children some basic life skills. In response to question number ten, 100% of respondents agreed to continue using the mobile application. In addition, in response to question 11, the parents of the children will recommend AutoVid to their children's peers.

5. Conclusion

We created a smartphone application for autistic children aged seven to eight years old that includes the foundations of social and communication skills. The main purpose for focusing this mobile application on a specific set of children aged seven to eight is to guarantee that parents and teachers can educate autistic children at a young age, as autistic youngsters are notoriously difficult to influence. The mobile application focuses on video prompting and forward chaining methods since both are important in capturing autistic children's attention so that they can concentrate and acquire self-care skills through the app. Autism may be improved by providing autistic people with an appropriate education approach that suits them, allowing them to catch up on their self-care skills. The development and testing of AutoVid will be the focus of future effort on this project. To gather additional input on the mobile application, more testing should be done with more people. Extending the modules and activities will be used to carry out the development operation. Future final year students can improve this program by adding other languages, such as Tamil and Mandarin, to make it more useful for autistic children.

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