

E-LEARNING APPLICATION FOR AUTISM CHILDREN

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ABSTRACT: 'Auticore' is a e-learning mobile application that will particularly help all the autism children to learn communication skills and to become a productive child from the childhood. All the features and interfaces are designed for children with autism spectrum disorder and Important features which may improve the quality of their learning abilities. The Sustainable Development Goals (SDGs) are a global plan to reduce inequality both inside and between countries. Autism is one of the challenging factors nowadays. Autism spectrum disorder, the name adopted in 2013, is a developmental disorder characterized by persistent problems in social communication and interaction, along with restricted and repetitive patterns of behavior, interests, or activities. The following project is specified the implementation process of E-learning application for students with autism spectrum disorder. The main goal of the project is to develop a mobile application to create a better and smartest way to learn social communication skills for children with Autism Spectrum Disorder (ASD).

KEY WORDS: Autism Children, E-Learning, Mobile App, Android, Donation

1. INTRODUCTION

Children with ASD frequently differ from their peers in terms of how they communicate, conduct, and learn. Such variations can lead to issues with social interactions, which can lead to problems at school, family tension, and feelings of loneliness. Nowadays, A few mobile applications for autism spectrum disorder have been developed, but they are not free that's why they are not familiar with the Mobile application often. Moreover, some families cannot afford to purchase an application for their autism children, for example, B40 families do not think about to buy or subscribe monthly a mobile application for their children for better communication skills. And some families unable to tech their autism children at home because parents do not have enough knowledge to teach their autism children.

Furthermore, All the exiting application does not separate their user (autism children) to learn better communication skill for their everyday life. So, we plan to create an eLearning application (Mobile Application) for autistic children to help them improve their communication abilities. Our apps will teach them some basic knowledge to enhance their communication skills and this application will focus on three category users (autism children) which are 2 to 4 years kids, 5 to 8 years children, and 9 to 12 years children.

2. PROBLEM STATEMENT

Presently, there is no existing mobile application that provides free of charge and specified the category of autism children. As a result, autism children do not get proper test of technology and parents do not provide quality education to their Autism children. These are specific problems with the existing application that “Auticore” will solve by developing a mobile application for autism spectrum disorder. Such as, lake of sources to develop communication skills for autism children, existing application is not free of charge, user need to pay money to download and use it, most of the application have developed for IOS uses, available mobile apps focus only playing games that is not suitable for all level autism users, existing apps do not specify the users and their features are for all autism children randomly. In this technological age, when all the children are used to with the technology. So, our aim to develop best eLearning application for autism children that they can adopt very easily, and our goal is no autism children left behind.

3. PROJECT OBJECTIVE

The main purpose of this application is to connect with the autism children and make sure best quality electronics learning platform for them. Good educational contents will be provided for autism children. It will allow users to use our application.

The developer will be able to create a prototype of an application which may work with established Children with autism spectrum disorder by the end of this project. The app should run smoothly, and users should be able to access all of the services that we hope to create, and three targeted categories children will be find out their learning content in our platform. Aside from that, the application will assist the B40 family who do not think about money to purchase an application. This app will fulfil all requirements to achieve communication skills for autism people. User can find our application as a one of the best free applications for autism people. All android users can download freely. Majority of people use android operating system. This mobile application will be optimized in android operator system. It will fulfil one of the “SDG Goal-10” which is (Reduce inequality within and among countries)

4. PROJECT SCOPE

4.1. Scope for the users

- User friendly interface in the application for the autism children.
- A unique feature has been added that is category of autism children.
- Any children can learn our given contents without difficulties.
- Easy way to access into the application. User can differentiate categories of autism children’s contents.
- User can donate fund for autism children.

4.2. Scope for the application

- Registration for the users.
- In the dashboard, all the contents will appear in this part for autism children.
- A video section will be added in the application for user.
- A navigation bar that includes a home tab, explore tab, help tab, and profile tab.
- A music's option that users can listen some audio content.
- Donate now.

5. TARGET AUDIENCE

Target users will be the autism spectrum disorder children. "Auticore" mobile application will focus on three category users (autism children) which are 2 to 4 years kids, 5 to 8 years children, and 9 to 12 years children. Most specifically, Auticore application will assist the B40 family who do not think about money to purchase an application.

6. SYSTEM ADAPTION

Target users will be the autism spectrum disorder children. "Auticore" mobile application will focus on three category users (autism children) which are 2 to 4 years kids, 5 to 8 years children, and 9 to 12 years children. Most specifically, Auticore application will assist the B40 family who do not think about money to purchase an application.

6.1. General view

Table 1: General view of system

System Name/ Functionalities	Features &	Proloquo2Go	Otsimo	Endless Reader	Auticore
Mobile Application		✓	✓	✓	✓
Web Application		✗	✗	✗	✗
Required Internet		✓	✓	✗	✗
Integrated Database		✓	✓	✓	✓
User friendly interface		✓	✓	✓	✓
Free of charge		✗	✗	✗	✓
Free to access into the content		✗	✓	✗	✓
Contents Based on children age		✗	✗	✗	✓

6.1. Users view

Table 2: User view of system

System Name/ Functionalities	Features &	Proloquo2Go	Otsimo	Endless Reader	Auticore
Registration/ Login		✗	✗	✗	✓
Use in Android device		✗	✓	✓	✓
Use in IOS device		✓	✗	✓	✗

Donation system	✗	✗	✗	✓
Review	✗	✗	✗	✓
User can view all contents into the app	✓	✓	✓	✓

7. REQUIREMENT SPECIFICATION

The requirement specification displays the mobile application's specifications as well as the user requirements. To gather content requirements and information, the developers conducted a survey and a physical interview. The needs were gathered from autism guardians and experts, particularly those who are pretty concerned about people with autism. These requirements specifications will be used to propose system features that must be implemented within the mobile application to produce a functional app that meets the expectations of the user.

8. SYSTEM DEVELOPMENT LIFE CYCLE (SDLC)

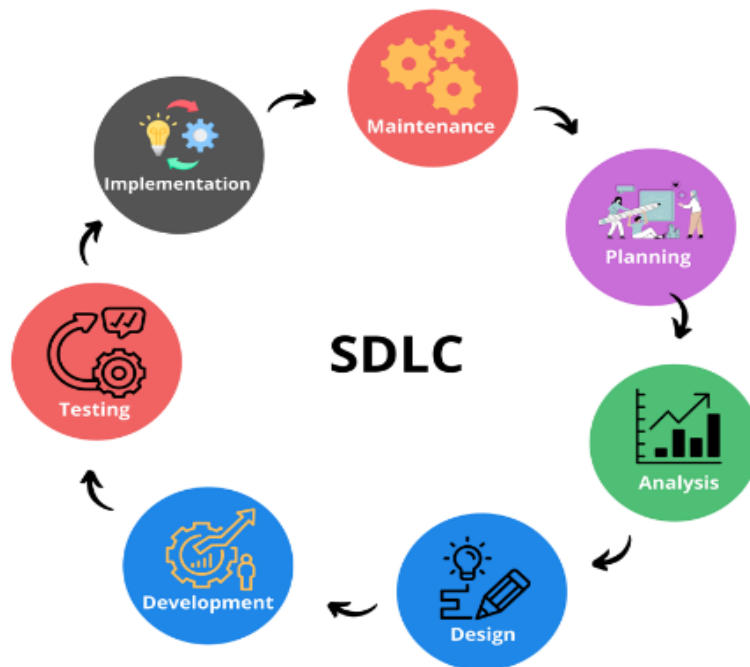


Fig. 1. System Development Life Cycle

System Development Life Cycle is the flow of the working process to develop the stages of a project. The SDLC provides a visual representation of the project's processes, assisting in meeting user expectations, meeting deadlines, and estimating costs. This planned project contains seven steps, although the SDLC will not be completed until after the implementation. More details will be discussing in (8.1).

8.1. Implementation of system development life cycle (SDLC)

Table 3: System Development Life Cycle for Auticore application

SDLC PHASE	PHASE DISCRIPTION	PROPOSED SYSTEM PHASE	START & FINISH DATE	IMPLEM E-NTATION OF FYP
Planning	This phase of the project specifies user needs, determines required features, functionalities, and customizations, and assesses overall usability.	<ol style="list-style-type: none"> 1. Identify the problems and functionality in this phase. 2. The issues that will be resolved were anticipated. 3. The system's features have been planned well in advance. 	February 20, 2022, to March 10, 2022	1
Analysis	Users' demands were collected, evaluated, and represented in charts.	<ol style="list-style-type: none"> 1. Interviews with potential users were conducted for user needs, which included an autism guardian, experts, and an existing application user. 2. Based on the finding & result, new features and things will be evaluated. 	March 21, 2022 To May 13, 2022	1
Design	The transformation of requirements into software design	<ol style="list-style-type: none"> 1. Create low fidelity prototype. 2. Create high fidelity prototype. 	May 14,2022 To June 15,2022	1
Development	Building the system.	<ol style="list-style-type: none"> 1. The database will be integrated. 2. Frameworks were used to create the app. 3. Ensure that all functionalities have been developed. 	October 20,2022 To November 30, 2022	2
Testing	Assuring that the system satisfies the needs of the users.	<ol style="list-style-type: none"> 1. User Acceptance Testing (UAT) will be conducted. 	Decembe r15,2022 To	2

		<p>2. The errors will be corrected.</p> <p>3. All the function will be tested and evaluated.</p> <p>4. All features and function will be checked whether it's working or not accordingly.</p>	December 27, 2022	
Implementation	Provide the software / developed system to the users.	<p>1. The system will be examined, and reviews will be collected from the users.</p> <p>2. Our application will be developed, and users will use it freely.</p>	December 28, 2022	2
Maintenance	It will be maintained by developers in the future.	System will be maintained for better services.	Always	2

9. REQUIRMENT SPECIFICATION

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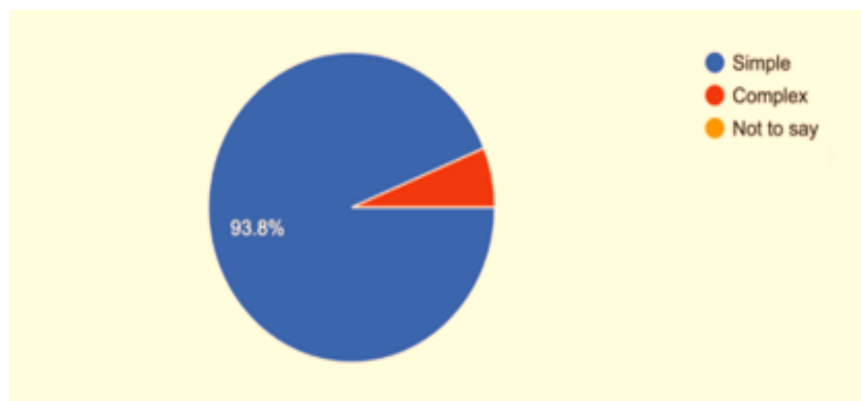


Fig. 2. Result of google survey about types of app interface

Almost everyone who took part in the survey agreed that the application should have a simple interface for autism children. Moreover, most of the content of the application should be categorized based on children age and most preferable

contents were Basic, Intermediate and Advanced. It is suggested by the participants of the google survey and percentage is 93.8 %.

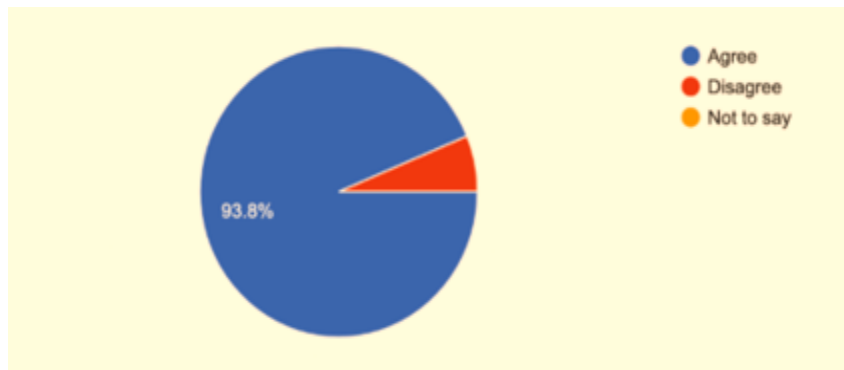


Fig. 3. Result of google survey about content should be categorized.

There were three categories in the survey but 2 to 4 years kids, 5 to 8 years children, and 9 to 12 years children was suggested among others option. The majority of respondents (93.8%) agreed that the contents of the e-learning application should be categorized according to the age of the autism children.

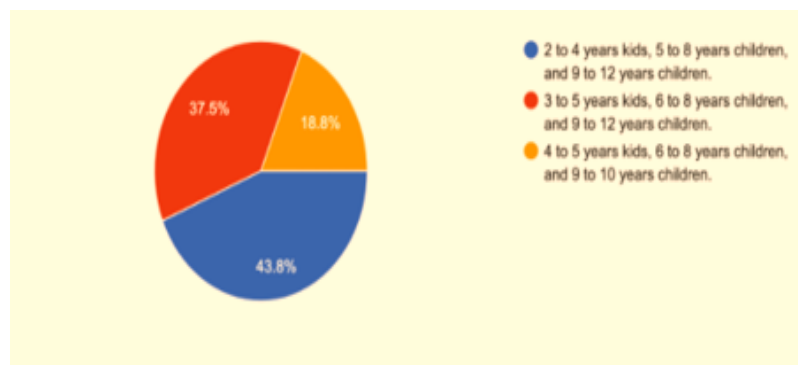


Fig. 4. Result of google survey about age to focus

The survey question indicated three possible child ages, but users chose '2- to 4-year-olds, 5- to 8-year-olds, and 9- to 12-year-olds.'

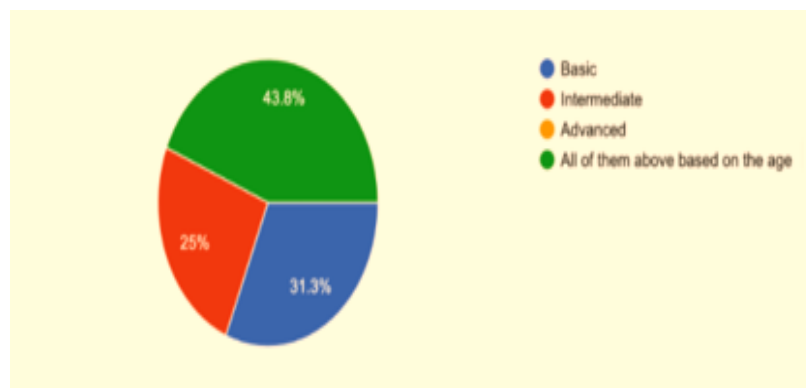


Fig. 5. Result of google survey about contents should be added into app

There were three contents in the basic section for the system's basic users, as suggested. Alphabet, Numbers, and Colours were among the contents. Most of participants chose three levels of content to include in the mobile application. Which are Basic, Intermediate, and Advanced. According to the graph, roughly 43.8 percent of customers prefer all three level contents combined based on the age of their children.

10. SYSTEM ADAPTION

Use case diagrams are the most common type of system/software requirements for newly produced software programs. Use cases describe the desired behavior, not the precise means of achieving it. Once defined, use cases can be used to indicate both textual and graphic representation. Use case modeling's ability to assist in system design from the standpoint of the end user is a fundamental idea. By describing all externally observable system behavior, it is a useful tool for explaining system behavior to users. Auticore application use case summarizes all the relationship between user and actor (Fig 6).

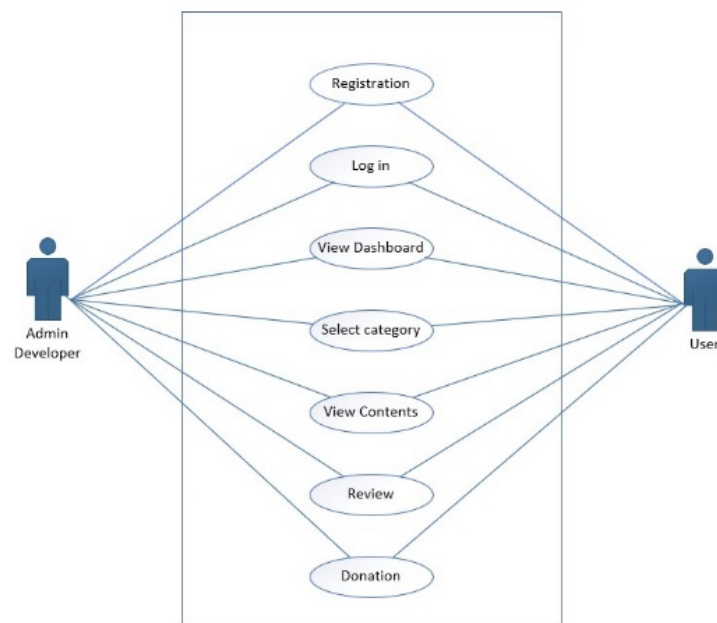


Fig. 6. Use case diagram of Auticore App

11. SYSTEM ADAPTION

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11.1. Landing page of Auticore app

The users will first see the landing page of Auticore mobile application. User will find a get started button to continue to move next step.



Fig. 7. Landing page of Auticore App

11.2. Login page of Auticore app

The users first point to access to the Auticore application is the homepage or Login page where all the categories of the application users are expected to login into the application. This is developed for the user to use contents of the application. Each user is directed to a category section once user login successfully. The information required on the login page includes the user email and their respective passwords.

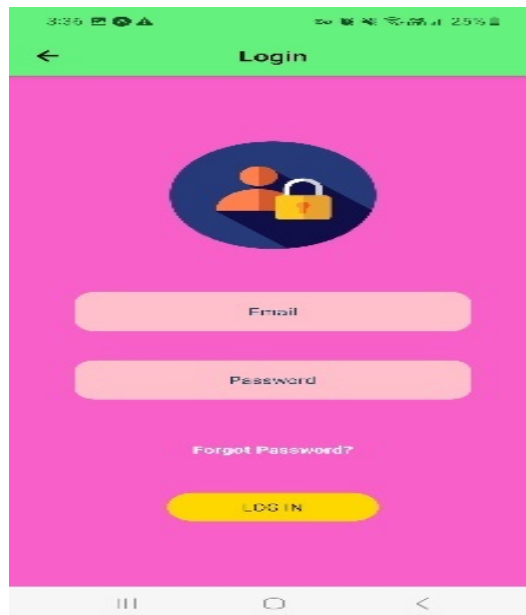


Fig. 8. Login page of Auticore App

11.3. Types of categories

User main home page or explore interface consists of basic, intermediate, advance, video, and music for learn from all contents. Each components provide different contents based on the autism children.

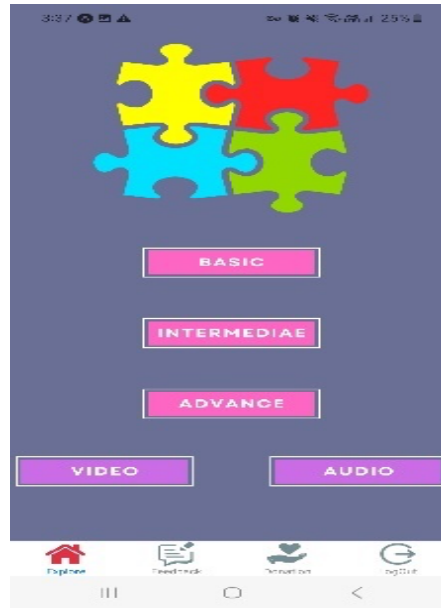


Fig. 9. Categories Interface of Auticore App

11.4. Content of basic

This section focuses on the three contains these are alphabet, color, and number. User can learn their lesson through these components. User can learn a-z English alphabet, different types of color name as well as all number through this section.

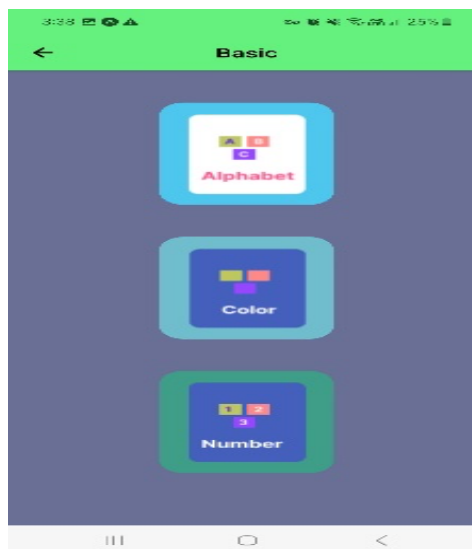


Fig. 10. Basic contents Interface of Auticore App

11.4. Content of Intermediate

When a user click on the intermediate content user will see their components on this section. User can gain lot of things through this section. This section also focuses on three contains which are animal, vegetables, and fruits. User will be

able to know the name of all the things when user will click on single content. When user click on animal, they will see the list of the animal names. Also, user can learn the name of vegetable as well as fruits.

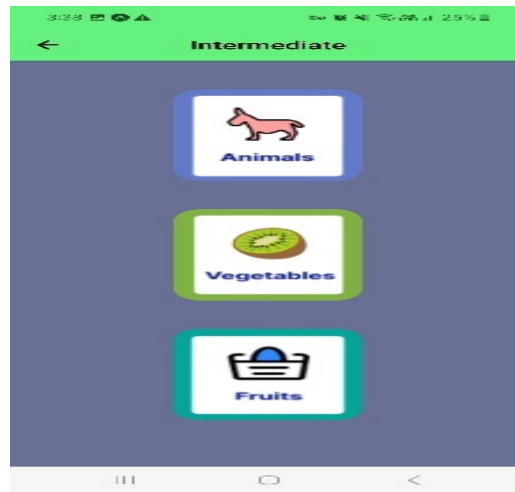


Fig. 11. Intermediate Interface of Auticore App

11.4. Content of Advance

In advance section, there are 4 content to learn. Auticore application is suggesting this section for the 10-12 years children. Four contents are earth, month, science, and weeks. This section will help the user to learn every of month name, all the weeks names. Also, user will know about some science related name as well as earth name. User will see the name of all components with the picture.



Fig. 12. Advance contents Interface of Auticore App

11.4. Audio

Once user click audio button, they will be directed to music section. Users will be able to listen alphabet and numbers music in this part.

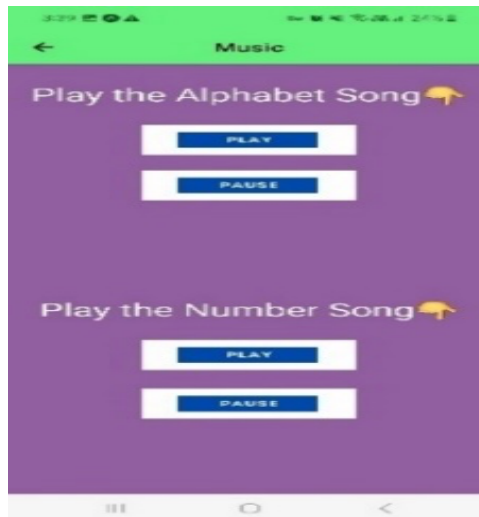


Fig. 13. Audio Interface of Auticore App

11.4. Video

When a user clicks the video button, they are sent to the videos area. In this section, users will be able to listen to and see videos of the alphabet, numbers, and other elements.

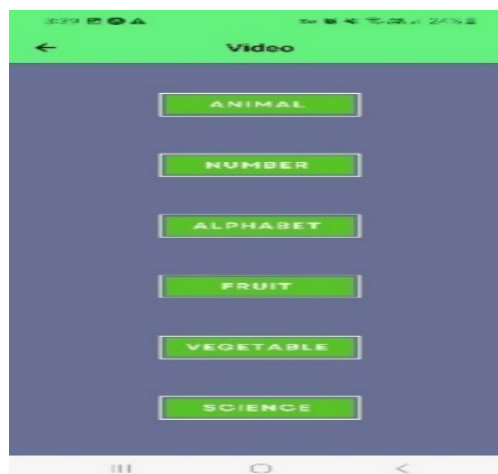


Fig. 14. Video Interface of Auticore App

11.5. Donation

Donation is the most unique section for Auticore mobile application. Each existing mobile application does not have the donation option specially on Autism spectrum disorder (ASD). Auticore application is providing a donation option. Every user can donate through the application. In this section, developer has provided the bank account details. Once user will be done the donation, they need to fill up the form. User has to provide the details as follows: name, account name, receipt number and date. Donated fund will be used for autism children and application maintenance.



Fig. 15. Advance contents Interface of Auticore App

11.6. Feedback

In this section, user will give the feedback about Auticore application. Based on feedback, developer will enhance the leaking’s of Autism application.

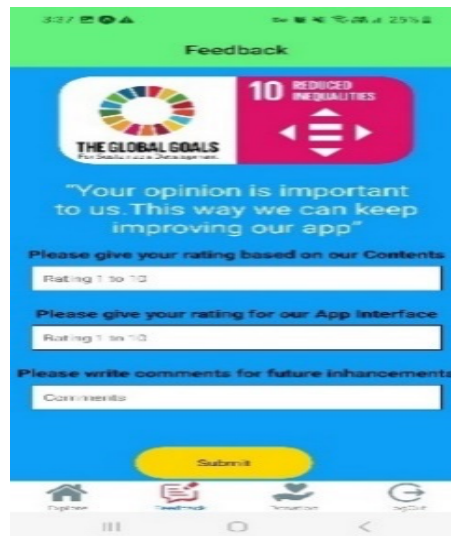


Fig. 16. Feedback Interface of Auticore App

12. SYSTEM TESTING

Table 4: System Development Life Cycle

PAGES	TEST DATA	TEST CONDITION	EXPECTED RESULT	ACTUAL RESULT (√)	REMARKS

Welcome Page	N/A	All the buttons are working.	Users can navigate to the Login / Sign up page.	√	Worked fine
Sign up/Registration Page	Email and Password	Sign up button is working.	New users can navigate to the dashboard page easily.	√	Worked fine
Log-in Page	Email and Password	login button is working.	Existing authorized users can navigate to the dashboard page easily.	√	Worked fine
Basic Page (1st category of content)	N/A	button is working and users are able to view all the basic contents.	Users can navigate and view all the basic contents straightforwardly.	√	Worked fine
Intermediate Page (2nd category of content)	N/A	button is working and users are able to view all the Intermediate contents.	Users can navigate and view all the Intermediate contents straightforwardly.	√	Worked fine
Advanced page (3rd category of content)	N/A	button is working and users are able to view all the Advanced contents.	Users can navigate and view all the Advanced contents straightforwardly.	√	Worked fine
Videos page	N/A	Videos and buttons work well.	Users can select which video they want to watch and video contents are well defined.	√	Worked fine
Audio Page	N/A	Audio and button work well.	Users can play their favorite audio song simultaneously.	√	Worked fine
Feedback Page	Contents Rating, App Interface Rating, Future Enhancement Rating	All input fields and buttons are working.	Successfully, view all the contents and feel free to provide feedback/comments for this application.	√	Worked fine

Donation Page	Full Name, Identification Number, Account Numbers, Bank Name, Receipt Number, Date of Payment.	All input fields and buttons are working.	View all the contents, provide feedback for future enhancements and users can perform Donation for Autism children and application Maintains.	√	Worked fine
Logout Page	N/A	button is working.	Users can simply Logout from the application once learning time finishes.	√	Worked fine

The User Acceptance Test (UAT) was conducted face-to-face in Gombak Selangor, Kuala Lumpur, Malaysia. We conducted it on December 31, 2022, for all three participants. The first two participants were housewives, they have children with autism spectrum disorders. These three participants were interviewed during the data collection, and they knew the objective of this project and the background problem. The last participant was an expert and a Ph.D. student at IIUM, Kuala Lumpur, Malaysia. However, an order was followed to conduct the UAT to make it organized. The team re-explained the background of the problem and project objectives where it was required. A brief explanation of the application was given. After that, the users navigate around the application and the team asks them for and then the participants asked questions about their experience and perception of this system. The results from the UAT are provided below.

13. CONCLUSION

The target of this project was to provide an interactive platform where users could view, read, listen to music, watch videos, leave comments, or feedback, and donate to autistic children all around the world. All of the objectives were accomplished successfully.

13.1. Future work

Betterment knows no bounds. In the future, e-wallets, as well as a chat box system, might be added to the system to make it easier for app users, donors, and developers to communicate. The UAT participants proposed to include audio voices in each topic category (basic, intermediate, and advanced).

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