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Research Article

Basic SolatFor Autism- A development guidance Mobile Apps

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Abstract: Basic SolatFor Autism – An Islamic basic salat app that uses prayer psychotherapy and repeating learning to betterment in term of communication and social problems for autism kids. The apps targeted mild autism male kids aged 6 to 12. In the app there are learning part that focus on wudu' and prayers, while gaming part that have quiz and puzzle which will have 3 level each mode. There are few kids' app in the market that teach about Islamic prayer, but the app does not focus on the need of autism. Multimedia Mobile Content Development (MMCD) is used as the methodology to develop the learning apps. MMCD covers all the need in creating a learning apps for kids. The result from the alpha and beta testing shows that the app is useful and interesting and it is suitable for autism, as the app work like it should in alpha and 92.63% for beta testing. However, there are a few improvements can be done in the future.

Keywords: Autism, Color Spectrum, Islamic, Multimedia Mobile Content Development

1. Introduction

Autism is a developmental disorder characterized by difficulties with social interaction and communication, repetitive behaviors, speech and nonverbal communication. In Islam autism is said to be as a low mental ability, this means they with autism also have the same responsibility of a normal abilities Muslim and Muslimah. Not only that Islam believes and has been proven that they are capable of being independent, competitive as well as highly skilled. Anxiety faced by autistic children such as learning, communication and social problems can be overcome with prayer psychotherapy [1].

As a parent it must be hard for them to teach their autism child as they have their own special need, for example color they prefer, the app will use suitable color so that it will cover their needs [2]. Furthermore, these autism children, they require the frequent and repetition to help with their memory, for the app it has learning part and gaming part that can attract these children to learn and understand about basic of salat.

In the year 2020 with the epidemic becoming worse and worse day by day, it seems that the new norm is without physical learning [3]. Next, repeating learning is the best way for them to develop their long-term memory, it is believed 300 hours of learning may help them. Moreover, color would also affect the autism mood, so the appropriate color will be used for the app would help avoid this [2].

They may be an app on Islamic approach, but they did not use the autism concept in the app. Does it seem that an autism app always related way to improve language and verbal, but not the spiritual approach. The main problem that leads to the app development are as there is not many Islamic approach in Autism Apps. Autism app is an app that have a repetition behavior, have specific routine and detailed statistic or time table.

2. Related work

A game approachhas been used to support learning and teaching especially in educational based games. There are many benefits for children including problem-solving and logic exercises, training motor nerves and spatial skills, establishing children's [4]. Autism (ASD) manifests in different levels of severity, so there will never be an exact identical characteristic of a person with this disorder. But, the common symptoms of having difficulty with communication, difficulty to socialize, Obsessive interest, and repetitive behavior are the most common amongst them. Thus, male is more likely to be diagnosed with this disorder. The app used a multimedia output concepts to teach them the basics of salat. Thus, the app applied repetition learning through Assistive Technology (AT) with its intention to support autistic children with difficulties they encounter in their lives[5].

Every autism child has different colors preference, as we know when designing an app for children with autism, the effect of colors should be considered as it is an important aspect of the app as it covers all the app UI (user interface). For a learning app it needs optical stimulation [6]. In a study about colors, it is believed dull

colors with whitish or greyish undertones have a calming effect on children in this spectrum. Light pastel pink has often been chosen as the favoritecolor for children with autism in some tests conducted. Cool colors such as blue and green also have a soothing effect [7].

Table 1: Comparative analysis between existing application

Application	Description
Complete Prayer Guide + audio 	• The learning app teaches on how to do salat and ambulation step by step. • Also includes zikir and dua after salat • Targeted for kids. • Need to pay Rm 4.49 for the app to be adds less.
Learn to pray 	• Targeted for Muslim kids or mature. • A learning app that teaches the step by step in salat the proper way for salat fardhu. • 2 language option they are English and Indonesia. • App also includes Arabic, Latin and English translation.
Language and Cognitive Therapy for Children (MITA) 	• A language and Cognitive Therapy for Children • A first and only language therapy application supported by clinical data • App is targeted for autism children. • The app is available in English, Spanish, Portuguese, Russian, German, French, Italian, Arabic, Farsi, and Chinese.

Based on Table 1 a comparative analysis between existing application has been done, the comparative analysis between the existing application. All the applications have their own strengths and weaknesses. The most stand-off app is the Language and Cognitive Therapy for Children (MITA) as it is being supported by clinical data and being updated weekly till this day. But the app does not focus on the religion part compared to the other two apps. This shows that the mixture of Islamic and autism requirements was not be prioritized for all of the market apps.

3.Methodology

The MMCD Methodology that is chosen for Basic Solat 4 Autism as, the app teaches step by step to perform ablutioan and Islamic prayer. The app will content images and audios. This application was designed targeted for android smart-phone. The development is using MMCD Methodology based on Figure 1, where unity engine was used as the development tool. The methodology contains five main components which is

application idea creation stage, structure analysis stage, process design stage, main function development stages, and lastly testing stage[8].

The MMCD will helps development to speed up the application development process and at the same time optimize the mobile processing usage and data usage. The beauty of MMCD methodology that focused on the content navigation and objects used were identified as the key characteristic[8]. So, this is the most suitable methodology can be used to develop Basic Solat 4 Autism.

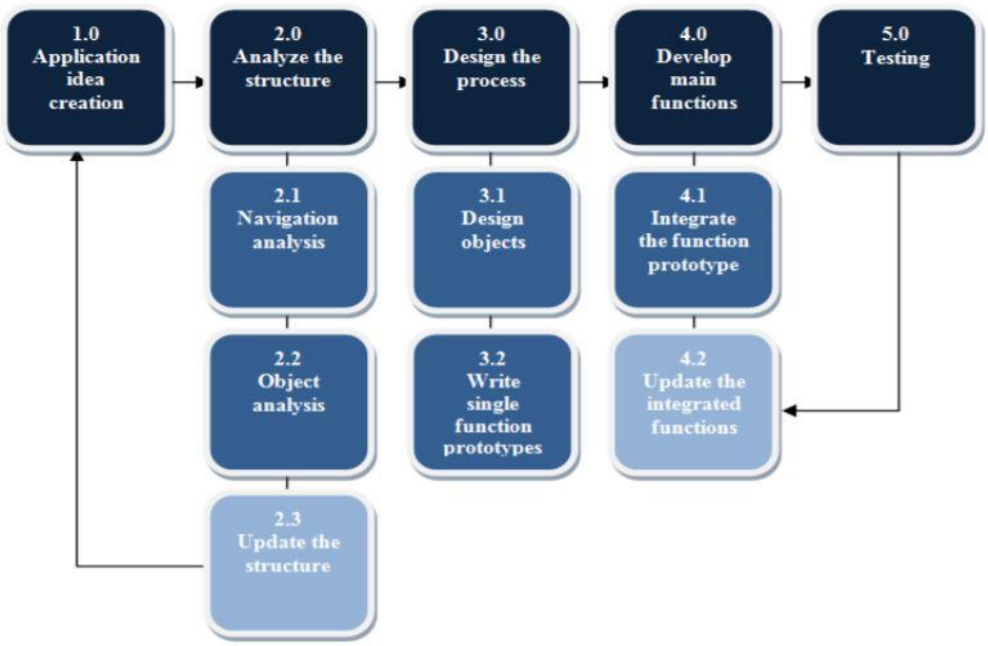


Figure 1: MMCD methodology

3.1 Application idea creation stage

For the first step of MMCD in application idea creation page, all the ideas and concepts of the app are defined like the app will be in 2D and the targeted audience are for male mild autism children aged 6 to 12 years. The preliminary test has also been done in this phase by giving a set of simple questionnaires to the target user parent. A SME (Subject Matter Expert) named Siti NorAfiqa Abdul Aziz from SK Batu 6 1/2 Segama Lahad Datu as A Special Education teacher is also being interviewed. All the requirements in developing the app are also mapped out like the hardware and software used to build the android-based app.

The software chose were the Unity engine, Firebase API, Audacity and Adobe Illustrator. Firstly, unity engine will be used to developed the app in 2D environment. Next, the Firebase API will be used are the Authentication and the Realtime Database to store all data of the user. While, Audacity will be used to modified all the audio will be user in the learning app. Lastly, Adobe Illustrators will used to create all the image will be used for the app by making use of the vector image.

3.2 Structure analysis stage

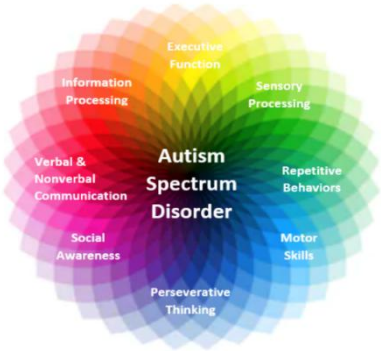


Figure 2 Autism Color Spectrum

In this phase, it will take all the information will be analyzed from the previous phase to create the UI/UX design, flow of the apps, color, language, font and feature of the app. As for Basic Solat 4 Autism, strict requirement has been detailed out, in terms of the color and how the app work. The color used must be within the autism color spectrum as show in Figure.2. In this phase also, the functional and non-functional requirement are detailed out as show in Table 2 and Table 3.

Table 2: Functional analysis

Category	Detail
User Interaction	• If the user clicks the button, the system shall display the what they click • In the option menu, the user can click the volume slider to adjust the in-game sound volume. • If the user clicks the exit button, the system shall show a pop-up message "Do you want to exit?" and the user can choose yes or no.
Autonomous system activities	• After launching the app for the first time, the system will display the Home Menu. • After the user chooses a play, the system shall play the sound needed. • After the user chooses a level difficulty, the system shall save the level difficulty. • After the user completes the level, the system shall calculate and display the score into the Scoreboard. • Each time the user completes the game, the system shall update the new score in the Realtime database.

Table 3: Non-functional analysis

Category	Details
Usability	• The application is in English language. • The application should be able to be used anytime. • The application should be easy to use.
Implementation	• The application shall be able to run using Android platform • The application can be run on any available platform in unity.
Performance	• The average response time between click and reaction is less than 0.1 seconds. • The application should be able to load the game within 1 seconds. • The database should respond within 0.5 seconds.
Security	• User can only edit their own data only. • No data can be accessed without authentication.

Based on Table 2 and Table 3, requirement analysis is the first activity that needs to be implemented in application development. This is because without a proper analysis the last product will not be used by the end

user as it does not have what is needed by the user. Without the analysis it will not have the require quality and standard. So, in this stage the requirement analysis will be explained in detail in terms of user, functional, and non-functional analysis. If the more ideas are required it will repeat the first phase before proceeding to the next phase.

3.3 Process design stage

In this phase the actual app development took place. The audio is being recorded and modified by using audacity, the image files are being created using Adobe Illustrator, and the app is being developed and tested using Unity 2d as the app uses 2d style. All the media file created is being imported to unity in .png (transparent image) or Jpeg images file format and wav/Mp3 audio format. All the media is being used in a scene and some coding is being done using C# language. Firebase API is also being imported as the app will have a Firebase Authentication function and Firebase Realtime Database. All the developed scenes are being tested by using the Oppo A9 2020 to ensure the correct outputbefore being compiled as one in the next phase.

3.4 Main function development stages

In this phase, after the app is compiled into one, it was fully tested scene by scene using the test plan document that is produced based on the functionality and non-functionality requirement, flowchart, navigational structure and content structure. The testing is called Alpha testing, the main purpose is to make sure all the app content and the navigation work properly. So, this mean all the flaws that are being identified and fixed to ensure the app like it is supposed to.

Figure 3 Google service

```
152
153     private IEnumerator Register(string _email, string _password, string _username)
154     {
155         if (_username == "")
156         {
157             //If the username field is blank show a warning
158             warningRegisterText.text = "Missing Username";
159         }
160         else if(passwordRegisterField.text != passwordRegisterVerifyField.text)
161         {
162             //If the password does not match show a warning
163             warningRegisterText.text = "Password Does Not Match!";
164         }
165         else
166         {
167             //Call the Firebase auth signin function passing the email and password
168             var RegisterTask = auth.CreateUserWithEmailAndPasswordAsync(_email, _password);
169             //Wait until the task completes
170             yield return new WaitUntil(predicate: () => RegisterTask.IsCompleted);
171 
172             if (RegisterTask.Exception != null)
173             {
174                 //If there are errors handle them
175                 Debug.LogWarning(message: $"Failed to register task with {RegisterTask.Exception}");
176                 FirebaseException firebaseEx = RegisterTask.Exception.GetBaseException() as FirebaseException;
177                 AuthError errorCode = (AuthError)firebaseEx.ErrorCode;
178 
179                 string message = "Register Failed!";
180                 switch (errorCode)
181                 {
182                     case AuthError.MissingEmail:
183                         message = "Missing Email";
184                         break;
185                     case AuthError.MissingPassword:
186                         message = "Missing Password";
187                         break;
188                     case AuthError.WeakPassword:
189                         message = "Weak Password";
190                         break;
191                     case AuthError.EmailAlreadyInUse:
192                         message = "Email Already In Use";
193                         break;
194                 }
195                 warningRegisterText.text = message;
196             }
```

Figure 4 Register

```
100     private IEnumerator Login(string _email, string _password)
101     {
102         //Call the Firebase auth signin function passing the email and password
103         var LoginTask = auth.SignInWithEmailAndPasswordAsync(_email, _password);
104         //Wait until the task completes
105         yield return new WaitUntil(predicate: () => LoginTask.IsCompleted);
106 
107         if (LoginTask.Exception != null)
108         {
109             //If there are errors handle them
110             Debug.LogWarning(message: $"Failed to register task with {LoginTask.Exception}");
111             FirebaseException firebaseEx = LoginTask.Exception.GetBaseException() as FirebaseException;
112             AuthError errorCode = (AuthError)firebaseEx.ErrorCode;
113 
114             string message = "Login Failed!";
115             switch (errorCode)
116             {
117                 case AuthError.MissingEmail:
118                     message = "Missing Email";
119                     break;
120                 case AuthError.MissingPassword:
121                     message = "Missing Password";
122                     break;
123                 case AuthError.WrongPassword:
124                     message = "Wrong Password";
125                     break;
126                 case AuthError.InvalidEmail:
127                     message = "Invalid Email";
128                     break;
129                 case AuthError.UserNotFound:
130                     message = "Account does not exist";
131                     break;
132             }
133             warningLoginText.text = message;
134         }
135         else
136         {
137             //User is now logged in
138             //Now get the result
139             User = LoginTask.Result;
140             Debug.LogFormat("User signed in successfully: {0} ({1})", User.DisplayName, User.Email);
141             warningLoginText.text = "";
142             confirmLoginText.text = "Logged In";
```

Figure 5 Login

```
21      private void Awake()
22      {
23          if (instance == null)
24          {
25              instance = this;
26          }
27          else if (instance != null)
28          {
29              Debug.Log("Instance already exists, destroying object!");
30              Destroy(this);
31          }
32      }
33
34      //Functions to change the login screen UI
35
36      public void ClearScreen() //Turn off all screens
37      {
38          menuUI.SetActive(false);
39          learnUI.SetActive(false);
40          gamesUI.SetActive(false);
41          scoreUI.SetActive(false);
42          scorepuzzleUI.SetActive(false);
43          scorequizUI.SetActive(false);
44          viewdetailUI.SetActive(false);
45          editdetailUI.SetActive(false);
46          settingUI.SetActive(false);
47      }
48      public void MenuScreen()
49      {
50          ClearScreen();
51          menuUI.SetActive(true);
52      }
```

Figure 6 Change scene

```
46          public void UpdateL1()
47          {
48              PlayerPrefs.SetInt("Level",1);
49              Lvl2.SetActive(true);
50              Lvl3.SetActive(true);
51          }
            0 references
52          public void UpdateL2()
53          {
54              PlayerPrefs.SetInt("Level",2);
55              Lvl1.SetActive(true);
56              Lvl3.SetActive(true);
57          }
            0 references
58          public void UpdateL3()
59          {
60              PlayerPrefs.SetInt("Level",3);
61              Lvl1.SetActive(true);
62              Lvl2.SetActive(true);
63          }
64      }
```

Figure 7 Level setting

```
Assets > Scripts > Setting > SetVolume.cs > ...
1   using System.Collections;
2   using System.Collections.Generic;
3   using UnityEngine;
4   using UnityEngine.Audio;
5   using UnityEngine.UI;
6
7   public class SetVolume : MonoBehaviour {
8
9       public AudioMixer mixer;
10
11      public Slider slider;
12
13      void Start()
14      {
15          slider.value = PlayerPrefs.GetFloat("MusicVolume", 0.5f);
16      }
17
18      public void SetLevel (float sliderValue)
19      {
20          mixer.SetFloat("BackSound", Mathf.Log10(sliderValue) * 20);
21          PlayerPrefs.SetFloat("MusicVolume", sliderValue);
        }
    }
```

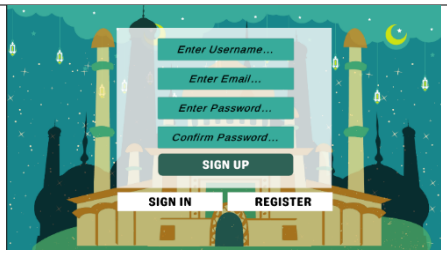
Figure 8 Audio setting

Based on Figure 3 shows the google service, without the code the firebase connection cannot be established for the app. While in Figure 4 and Figure 5 are the register and login for the app user account using the firebase authentication, this line of code is coded so user data will be saved into the firebase real time database for user detail and user score. Next, Figure 6 is one of change scene code that enable using change scene within the app, these code also will also be affected by Figure 7 level setting code that give user control on which level can be access and be locked. The Audio setting that will control the volume of the app. All code used C# as a coding language.

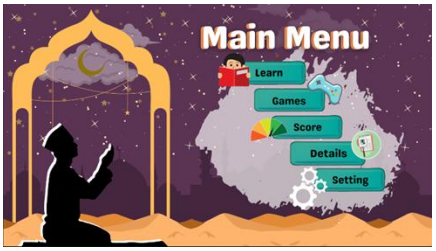
Then, this phase will also be the phase where all the interface for the Basic Solat 4 Autism is completed, a UI or user interface is the series of screens, pages, and visual elements that enable user to interact with the computer or devices. A good UI should be easy to use and easy to understand. Table 4 below will show the interface of the app.

Table 4: User Interface Design

User Interface	Description
	• This is the home menu before login • User need to click enter to start the game. • By clicking enter user are redirected to the Login Menu.
	• This is the Login Menu. • For user who have register for the app may proceed to login. • For the first user they need to register first before using the app. • User are required to input their register email and password, if the email and password are valid user will be redirected to Main Menu



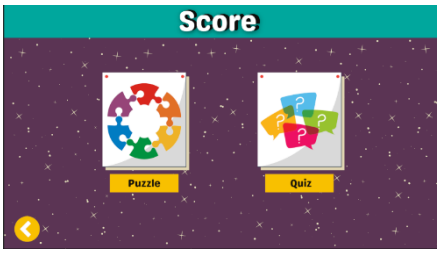
- This is the Register Menu.
- Here user is required to fill all the input required.
- The minimum password length required is 8.
- After completing the require input user need to click register, the data will be saved in the Firebase Authentication and Firebase Realtime Database.



- This is the Main Menu.
- User can choose between 5 options.
- Learn will redirect to Learn Menu.
- Games will redirect to Games Menu.
- Score will redirect to Scoreboard Menu.
- Detail will redirect to View details.
- Setting will redirect to Setting Menu.

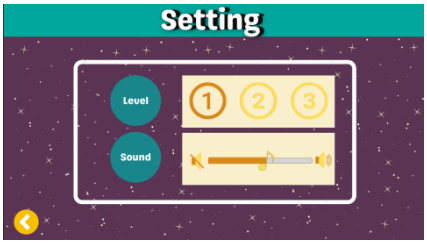
- This is the Learn Menu.
- User can choose between 2 option or go back to Main Menu by clicking the back-button icon.

- This is the Games Menu.
- User can choose between 2 option or go back to Main Menu by clicking the back-button icon.



- This is the Scoreboard Menu.
- User can choose between 2 option or go back to Main Menu by clicking the back-button icon.

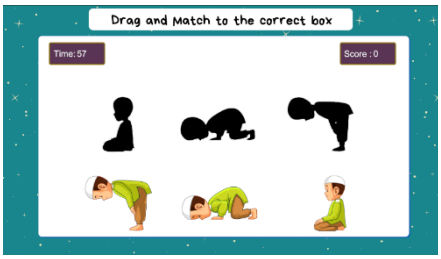
- This is the View details.
- User can update their data in here.
- User can go back to Main Menu by clicking the back-button icon.



- This is the setting Menu.
- User can set the level of difficulty and the audio volume of the game.

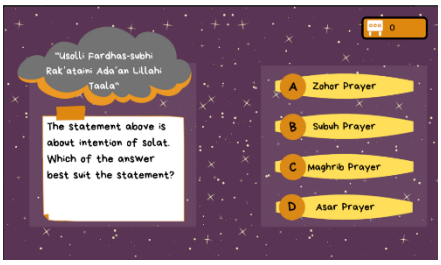
- This is the learning module.
- User can press next to go to next scene.
- For available audio, user will be given a play audio button.

- This is the Puzzle game Level 1-Level 2.
- The question will be asked and be written in the question box in the middle.
- Time available will be shown in the top left.
- The score will be shown in the top right.
- User are required to click on the correct answer.

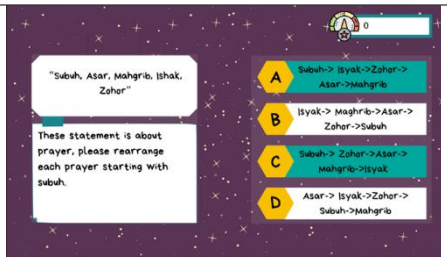


- This is Puzzle game Level 3- Drag and drop
- Time available will be shown in the top left
- The score will be shown in the top right
- The user needs to drag and drop the image to the correct box.

- This is Quiz Level 1
- Time available will be shown in the top left
- The score will be shown in the top right
- The question will be asked and be written in the question box in the middle.
- The answer will be shown in the bottom mid-section.
- User are required to click confirm button after they choose their answer.



- This is Quiz Level 2-3
- The score will be shown in the top right
- The question will be written in the question box in the left section.
- The answer will be shown in the right section.
- User are required to click between A to D button to answer the question.



Furthermore, the functional testing was carried out on the proposed application to test whether the actual functionality of the application whether it works the way it was planned. In this testing phase, the functionality of the four-module for Basic Solat 4 Autism has been tested which is shown in Table 5 to Table 9 on how the result of the alpha testing.

Table 5. Authentication Function Test Case

No	Test Case	Expected Output	Actual output
A1	Email_Input	need to enter a real email	need to enter a real email
A2	Password_Input	minimum 8 number of characters	minimum 8 number of characters
A3	Enter_Button	Redirect to login	Redirect to login
A4	Login_Button	Check Authentication and redirect to Menu	Check Authentication and redirect to Menu
A5	Sign In_Button	Redirect to Login	Redirect to Login
A6	Register_Button	Redirect to Register	Redirect to Register
A7	Input_Username	Enter text	Enter text
A8	Input_Email	need to enter a real email	need to enter a real email
A9	Input_Password	minimum 8 number of characters	minimum 8 number of characters
A10	Input_RePasssword	minimum 8 number of characters and will be compare to Input_password	minimum 8 number of characters will be compare to Input_password
A11	SigbUp_Button	If all fill and as it should, it will save the register user to Firebase and redirect to Login	If all fill and as it should, it will save the register user to Firebase and redirect to Login
A12	Input_Username	can input as string	can input as string
A13	Input_Address	can input as string	can input as string
A14	Input_Age	only able to input int	only able to input int
A15	Input_Phone_Number	only able to input int	only able to input int
A16	Save_Button	Save user detail to the database	Save user detail to the database
A17	View_Details_Button	Retrieve and display Detail Data	Retrieve and display Detail Data
A18	View_Quiz_Score_Button	Retrieve and display Quiz Score Data	Retrieve and display Quiz Score Data

A19	View_Puzzle_Score_Button	Retrieve and display Puzzle Score Data	Retrieve and display Puzzle Score Data

Table 6 Learning Function Test Case

No	Test Case	Expected Output	Actual output
L1	Next_Button	Change to next scene and stop audio	Change to next scene and stop audio
L2	Play_Button	Play Audio	Play Audio
L3	Back_Button	Redirect to Learning Menu and save counter	Redirect to Learning Menu and save counter

Table 7 Game Function Test Case

No	Test Case	Expected Output	Actual output
G1	Enter_Button	Open the game scene and the game start	Open the game scene and the game start
G2	Button_1	Trigger the correct or wrong answer	Trigger the correct or wrong answer
G3	Button_2	Trigger the correct or wrong answer	Trigger the correct or wrong answer
G4	Button_3	Trigger the correct or wrong answer	Trigger the correct or wrong answer
G5	Button_4	Trigger the correct or wrong answer	Trigger the correct or wrong answer
G6	Button_5	Trigger the correct or wrong answer	Trigger the correct or wrong answer
G7	Button_6	Trigger the correct or wrong answer	Trigger the correct or wrong answer
G8	Collider_1	Trigger the correct or wrong answer	Trigger the correct or wrong answer
G9	Collider_2	Trigger the correct or wrong answer	Trigger the correct or wrong answer
G10	Collider_3	Trigger the correct or wrong answer	Trigger the correct or wrong answer
G11	Collider_4	Trigger the correct or wrong answer	Trigger the correct or wrong answer
G12	A_Button	Trigger the correct or wrong answer	Trigger the correct or wrong answer
G13	B_Button	Trigger the correct or wrong answer	Trigger the correct or wrong answer
G14	C_Button	Trigger the correct or wrong answer	Trigger the correct or wrong answer
G15	D_Button	Trigger the correct or wrong answer	Trigger the correct or wrong answer
G16	Back_Button	Redirect to Game Menu, save counter	Redirect to Game Menu and save counter, save counter

		and score	and score

Table 8 Setting Test Case

No	Test Case	Expected Output	Actual output
S1	Level1_Button	Set Level 1 difficulty	Set Level 1 difficulty
S2	Level2_Button	Set Level 2 difficulty	Set Level 2 difficulty
S3	Level3_Button	Set Level 3 difficulty	Set Level 3 difficulty
S4	Volume_Slider	Set the volume through the game	Set the volume through the game
S5	Back_Button	Redirect to Main Menu	Redirect to Main Menu

Table 9 Menu Test Case

No	Test Case	Expected Output	Actual output
M1	Learn_Button	Change to Learn Menu	Change to Learn Menu
M2	Game_Button	Change to Game Menu	Change to Game Menu
M3	Setting_Button	Change to Setting Menu	Change to Setting Menu

Based on Table 5 to Table 9 of the alpha testing, it shows every app feature works like it should as planned. This show the app work like it should before proceeding to the next phase which is testing stage that will cover the beta testing of the application.

3.5 Testing stage

In testing phase, it is for the beta testing. In beta testing means that the app will be deployed to the end user using the unity web platform and the apk file, the user has downloaded and used the app, then user is required to fill a google form as proof of the testing.

If the report of the beta testing shows an unsatisfied result, the flow of the methodology will return back to the Main function development stages. By doing this the app will receive an improvement and be fix to satisfied the target user. But for the purpose of the project, after the beta testing was done, the limitation and future work will be listed and concluded. So, this mean it will no longer be updated.

The beta testing is a closed beta for 10 participants chosen based on targeted audience/parent. Most of the tester have autism child, have autism siblings or the end user itself. As for the tester are not all android user, a windows version of the app is published for the purpose of the testing. The test was done using google with the set of question based on Figure 9 and Figure 10.

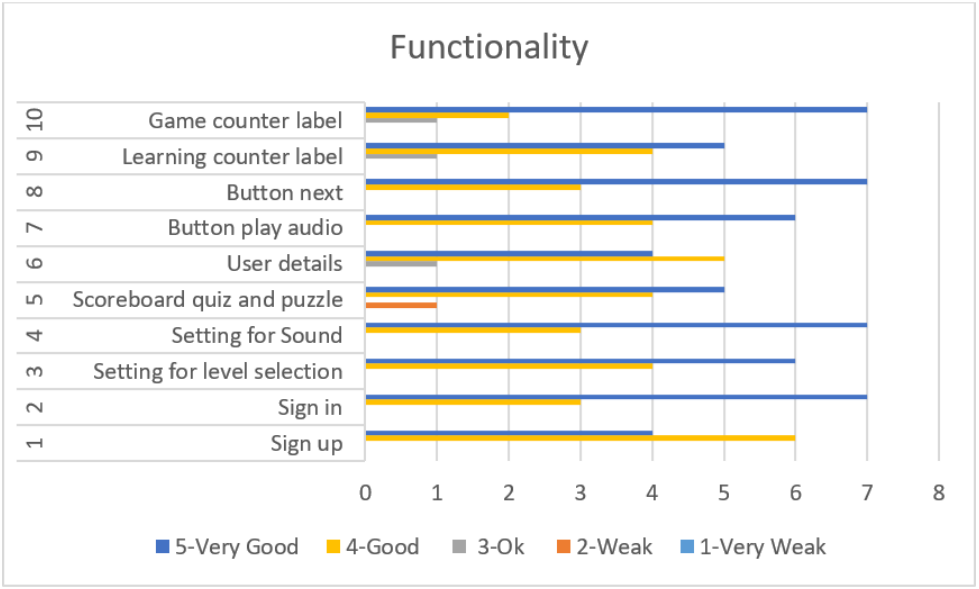


Figure 9 Functional Question

Based on Figure 9 functional question for question 1 show 6 respondents choose good and the rest 4 respondents chooses very good. For Question 2 show 7 respondents choose very good and the rest 3 respondents chooses good. Question 3 show 6 respondents choose very good and the rest 4 respondents chooses good. For 4 question 4 show 7 respondents choose very good and the rest 3 respondents chooses good. For Question 5 show 5 respondents choose very good while the rest 4 respondents choose good and 10 % choose weak. For question 6 show 5 respondents choose good while the rest 4 respondents choose very good and 10 % choose weak. For question 7 show 6 respondents choose very good while the rest 4 respondents choose good. For question 9 show 5 respondents choose very good while the rest 4 respondents choose good and 1 respondent choose ok. For question 10 show 7 respondents choose very good while the rest 2 respondents choose good and 1 respondent choose ok

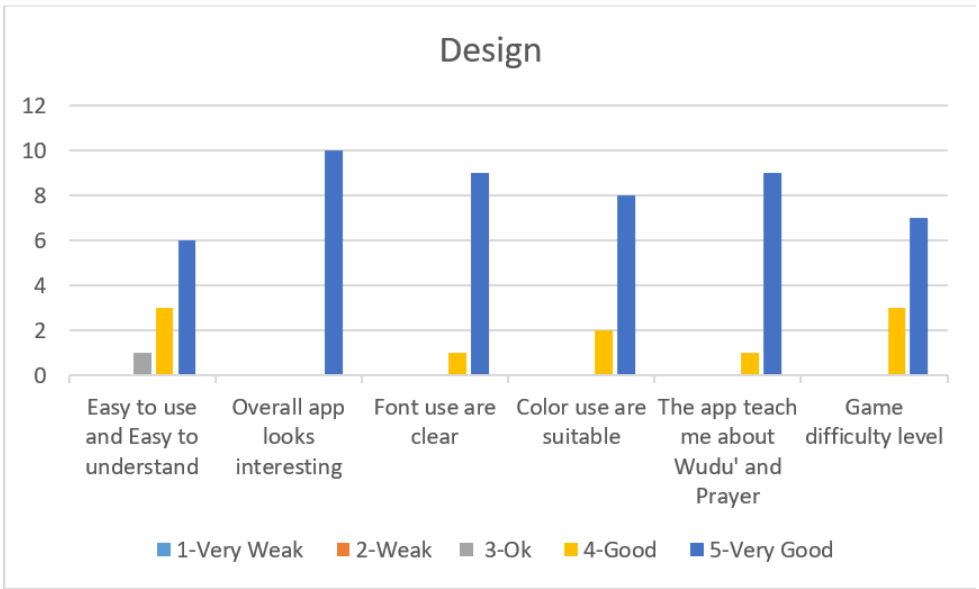


Figure 10 Design Question

Based on Figure 10 design question for question 1 show 6 respondents choose very good while the rest 3 respondent choose good and 1 respondent choose ok. For question 2 show 10 respondents choose very good. For question 3 show 9 respondents choose very good while the rest 1 respondents choose good. For question 4 show 8 respondents choose very good while the rest 2 respondents choose good. For question 5 show 9 respondents choose very good while the rest 1 respondent choose good. For question 6 show 7 respondents choose very good while the rest 3 respondents choose good.

4. Results and discussion

The results and discussion section presents data and analysis of the implementation of the proposed application and the testing of the proposed application. This section will cover more on the requirement analysis of each main module of each feature of this proposed application. Requirement analysis that will focus on User analysis, functional, non-functionality analysis. Next, it will focus on Application design that will contain the UI and UX design. Lastly, the alpha and beta testing phase will also be discussed in this section. The alpha testing phase is to ensure that all the system components are working as planned for Basic Solat 4 Autism, while the beta testing is used to know how satisfied the intended audience.

4.1 Beta testing

Every data and information collected has beenanalyzed. The next activity performed was to calculate the usage score from the feedback data taken from table 9 below. The technique used for the calculation is the System Usability Scale (SUS)[9]. A description of the calculation is as below.

Table 9 Beta Testing Result

No	Respondents' Score (R)										Score
Question	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	
Function											
1.	4	5	4	4	4	5	5	4	4	5	44
2.	5	5	5	4	5	5	5	4	4	5	47
3.	5	4	4	5	5	5	5	4	4	5	46
4.	5	5	5	5	4	5	5	4	4	5	47
5.	5	4	2	4	4	5	5	5	4	5	43
6.	4	5	4	5	3	4	5	4	4	5	43
7.	4	5	4	5	5	4	5	5	4	5	46
8.	5	5	5	4	5	5	5	4	4	5	47
9.	4	5	3	4	4	5	5	5	4	5	44
10.	5	5	3	5	4	5	5	5	4	5	46
Design											
1.	4	5	3	4	4	5	5	5	5	5	45
2.	5	5	5	5	5	5	5	5	5	5	50
3.	5	5	4	5	5	5	5	5	5	5	49
4.	5	5	4	4	5	5	5	5	5	5	49
5.	4	5	5	5	5	5	5	5	5	5	49
6.	4	5	5	5	5	4	5	4	5	5	47
Total											741

The formula used to get the usability result based on SUS is:

$$Y = \frac{P}{Q} \times 100\%$$

Where:

P = Total scores of respondents for each question.

Q = Total maximum of respondents scores.

Y = Percentage score.

Therefore:

$$Y = \frac{741}{800} \times 100\%$$

$$= 92.63\%$$

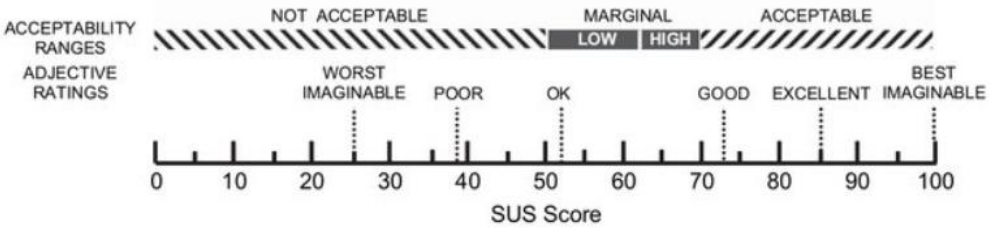


Figure 11 SUS Score [9]

Based on the scale of the SUS score shown in Figure 11, the proposed application SUS score is Excellent.

5. Conclusion

Based on the findings for alpha and beta for Basic Solat 4 Autism. All the function for the Alpha testing shows all function as it should. While in Beta testing based on Table 9 Beta Testing Result that been calculated is 92.63%. So, based on the Figure 3 SUS Score is in excellent level.

All the objective set of this app developed are all been met. The games are successfully developed based on the module set. The first objective which is "To design an app called Basic Solat 4 Autism based a preliminary questionnaire", based on the preliminary questionnaire, the design and flow are documented contents of the flow chart, navigation structure, and the UI and UX design. Next is "To develop an app called Basic Solat 4 Autism for the android platform", many researches been done in literature review in and all the content of the app is translated and used based of the official module and textbook Pendidikan Islam year 1 to year 5. The requirement for autism is also been clarify by the help of the SME. Furthermore, the alpha and beta testing were also successfully done as is the third objective for the project.

All the limitation of the app also been deducted. For some scene the titles are a bit long and took double the space. Next, the app does not have exit button. Other than that, the counters are only saved in phone not in the firebase as it will make the app slower. The app also has landscape rightorientation available is only. Then, the app only can be publish using Unity that support Android API 16 as Firebase unity need Android API 16 as for an upgrade will change the step to create the apk in unity.

Lastly, the app Basic Solat 4 Autism works like it should and it is suitable for autism used, and a hope to improve the app in the future based on future findings.

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