Turkish Journal of Computer and Mathematics Education Vol.12 No.11 (2021), 1129-1140

Research Article

Design And Development Of Learning Applications For Special Needs Students Using Android Studio (Case Study: Slb-Bc Yplab)

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Article History: Received: 11 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 10 May 2021

Abstract: Education is the fundamental key in the process of understanding and comprehending a subject. Special needs children are children who have special characteristics compared to children in general. One type of special needs children is children with an intellectual disability or often called mentally retarded children. The use of technology can also be applied as a medium, a means that can be used in the form of interesting videos and exercises where both of them are methods and keys for children's learning. By employing Android Studio as the learning method, it can create an interesting and entertaining learning atmosphere for mentally retarded children.

Key Word : Special Needs, Android Studio, Learning

1. Introduction

Children with special needs are children who have special characteristics compared to children in general. One type of special needs child is a child with an intellectual disability or often called mentally retarded children. According to Mulyadi (2012), mentally retarded children have a level of intellectual quotient (IQ) below average, which is below 70. This condition causes a lack of memorizing ability in mentally retarded children.

The ability of mentally retarded children who are below average results in them having difficulty receiving the lesson and having a weak perceptive power in receiving learning material. In order to help mentally retarded children in recognizing numbers, letters, senses, and some other materials, special media is needed that can create a fun and interesting learning atmosphere. The use of technology as a medium in the form of educational games is one of the key learning methods for mentally retarded children.

Based on these problems, this study aims to make a suitable learning media for mentally retarded children by developing a learning application using Android Studio for students with special needs at Kindergarten level. By employing this kind of learning method, it can create an interesting and entertaining learning atmosphere for kindergarten children in the classroom. Mentally retarded children also can accept the learning process more easily than usual.

2. Literature Review

2.1 Special Needs Children (SNC)

According to Desiningrum D.R. (2016) Special needs children are children who need special attention because of developmental disorders and other disorders experienced by children. In connection with the term disability, children with special needs are children who have limitations in one or several abilities, both physically, such as visually impaired and deaf, as well as psychologically, such as autism and attention deficit hyperactivity disorder (ADHD) (Desiningrum, 2016).

2.2 Mentally Disabled

According to Yosiani N. (2014) Mentally retarded children are children who experience obstacles in their mental and intellectual development which impact their cognitive development and adaptive behavior, such as being unable to focus their thoughts, having unstable emotions, preferring to be alone and silent, and sensitive to light .(Yosiani, 2014).

Mentally retarded children are individuals who significantly have intelligence below the normal population. According to the American Association on mental deficiency, they define mental retardation as a disorder for people whose IQs are below average i.e., below 84.

2.3 Learning

According to Pane A. (2017) Learning is a process of interaction between students and educators, with learning materials, delivery methods, learning strategies, and learning resources in a learning environment. The success in the teaching and learning process can be measured by the level of success in achieving educational goals (Pane & Dasopang, 2017).

2.4 Android

According to Makiolor, (2017) As an operating system, Android is used for Linux-based mobile devices included the operating system, middleware, and applications. Android also gives plenty of freedom and creativity so developers can create their unique applications. Initially, google inc. took over android inc. which is a newcomer to the manufacturing of cellphone or smartphone software (Makiolor, 2017)

Android SDK (Software Development Kit) is an API (Application Programming Interfaces) assist tool for developing Android-based applications using the Java programming language. SDK is often referred to as software that is useful for simulating Android OS on a PC (Makiolor, 2017).

2.5 Android Studio

According to Makiolor, (2017) Android Studio is categorized as an Integrated Development Environment (IDE) that Google can use. Android Studio is developed from the eclipse IDE and it is based on the popular IDE, IntelliJ IDEA. Android Studio also plans to be the official IDE for android application developers in the future (Makiolor, 2017).

2.6 Database

According to Sovia R. (2017) The database is a collection of files that are interconnected and interact with each other where the relationship between files is indicated by the key of each existing file. The database shows the data set used within the scope of the company or agency. Database processing is a method used to process a file where it can be arranged, sorted, retrieved at any time, and can be displayed in the form of a report so the information in the files can be processed neatly (Sovia & Febio, 2017).

3. Research Methods

This descriptive research used the Waterfall method which has the properties of a waterfall. The waterfall method has a data collection process and the process of collecting user needs using interview techniques, observation, and literature study. The system development method used the Software Development Life Cycle (SDLC) stage with the waterfall model. The waterfall model, sometimes called the classic life cycle, represents a systematic sequential approach to software development.

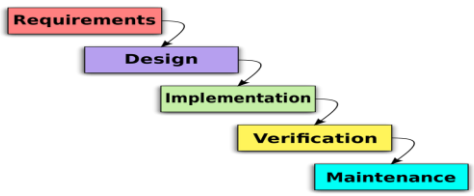

Figure 1. Waterfall Method

3.1 Requirement analysis

Communication is carried out so that the user can understand and achieve the goals he desired. The contents of this communication include analyzing an existing problem, collecting some of the required data, identifying the features and functions of a software. Later on, the collection of some additional data can be retrieved from the internet, articles, and journals.

3.2 Planning

The next stage is planning. This stage discusses the type of tasks to be carried out, the resources needed to develop the software, the risks that may occur, and the products to be produced.

At this stage, all elements and factors are thoroughly discussed so it can produce a satisfactory result. In addition, this stage will also discuss the work schedule that must be carried out and the tracking of the work process of a system.

3.3 Modeling

The third stage is the modeling stage or designing stage. It should be noted that at this stage, someone will design and model the system.

The design and modeling processes will focus on software architecture, data structure design, program algorithms, and program interface. This stage aims to understand more deeply the big picture of the object that is being developed.

3.4 Construction (coding and testing)

In the construction stage, there is a process where the design form is translated into code. Code is a language that will be read by a machine.

If the translation process into the code had been completed, then it will undergo a system testing process. The purpose of this test is to find out the mistakes in the code. If there is an error, it needs to be repaired first before moving on to the next stage.

3.5 Deployment

The deployment stage is the software implementation stage for the user. Moreover, this stage also includes a routine software maintenance process, software evaluation, software repair, and software development.

For the software development step, it can be carried out based on the good feedback given by the users. It aims so that the system can continue to operate and develop according to the users' needs.

4. Findings and Discussions

4.1 Business process

As a student

Based on the requirements analysis stage, the process flow of the learning application is shown in Figures 2 and 3 as follows:

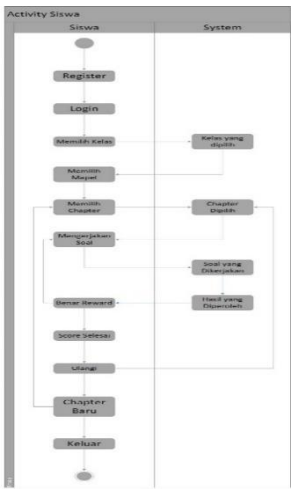

Figure 4.1 Students' Activities Diagram

As a teacher

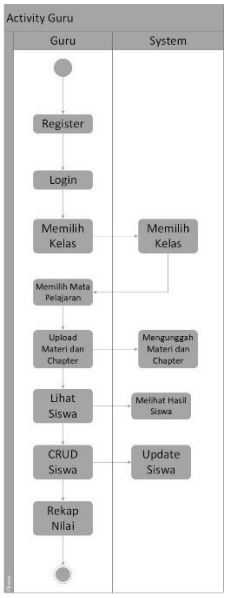

Figure 4.1 Teacher's Activities Diagram

4.2 Unified Modelling Language (UML)

The modeling of learning application software design for special needs children used the Unified Modeling Language (UML) to help build the Learn For Fun android-based application through an object-oriented approach.

4.2.1 Use case diagram

The use case diagram design describes the expected functionality and the relationship between the actors include students, teachers, and the system. The whole process is illustrated in Figure 4.2.1

Figure 4.2.1 Use Case Diagram

4.2.2 Class diagram

Class diagrams are used to describe a collection of classes and their relationships. The class describes the modal, view, and controller (MVC) of a system, as well as services to manipulate the state of a method or function so that the class has three main components i.e., names, attributes, and methods. The class diagram in the LFF learning application that will be developed can be seen in Figure 4.2.2 as follows.

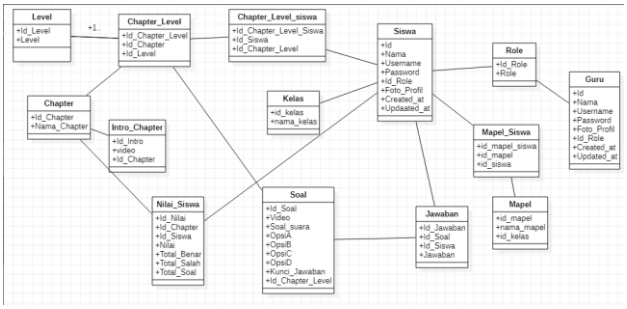

Figure 4.2.2 Class Diagram

4.2.3 Database design

The table design for the Android based application database "Learn For Fun" can be seen in the following table.

Table 1. Design Database

No	Table Name	Field
1	Chapter	**Id_chapter (pk),** nama_chapter,id_mapel(fk)
2	Chapter Level	**Id_chapter_level (pk)**, id_chapter(fk),id_level(fk)
3	Students' Chapter Level	**Id_chapter_level_siswa (pk)**,id_siswa(fk),id_chapter_level(fk), is_reset
4	Teacher	**Id (pk)**,nama,username,password,foto_profil ,id_role(fk),Id_mapel(fk),created_at,updated_at
5	Chapter Intro	**Id_intro (pk)**,video,id_chapter(fk)
6	Answer	**Id_jawaban (pk)**,id_soal(fk),id_siswa(fk),jawaban
7	Class	**Id_kelas (pk)**,nama_kelas
8	Level	**Id_level (pk)**,level
9	Subjects	**Id_mapel (pk)**,nama_mapel,id_kelas (fk)
10	Students' subjects	**Id_mapel_siswa (pk)**, id_mapel (fk),id_siswa (fk)
11	Students' score	**Id_nilai (pk)**, id_chapter (fk),id_siswa (fk),nlai,total_benar,total_salah, total_soal
12	Role	**Id_role (pk)**,role
13	Students	**Id (pk)**,nama,username,password,foto_profil ,id_role(fk),Id_kelas(fk),created_at,updated_at
14	Exercises	**Id_soal (pk)**,video,gambar,soal_suara,opsiA,opsB,opsiC,opsiD,kunci_jawaban Id_chapter_level (fk)

5. Implementation and Testing

The learning application (LFF) was built as an effective online learning method that has several functions:

a. The application has a login and register system
b. The application has class and chapter features.
c. The application has a CRUD feature (Create, Read, Update, Delete)
d. The applications can upload exercises in the form of video, audio, and images.
e. The application has a score recap feature in the form of the average of the entire chapter.
f. The application has a rewards feature at the end of the chapter.
g. The application has a recap feature of student data who have registered.
h. The application has a feature to see students in each class, this feature is intended for teachers.
i. The application has a viewing all students feature.
j. The applications can see the scores in the form of points.

The interface of the main features of the application can be seen in Figure 5.

The tests were carried out on the Android-Based Learning Application "Learn For Fun" using the Straight Line method using the black box testing method with 15 (fifteen) test scenarios as shown in table 2.

Table 2.

No	Tested Functionality	Testing Result
1	Register	Success
2	Login	Success
3	Students Data	Success
4	Update Teachers and Students Profiles	Success
5	Delete Student Data	Success
6	Create a Class	Success
7	Upload Material	Success
8	Added Class	Success
9	Added Subject	Success
10	Added Chapter	Success
11	Done the chapters/tasks	Success
12	Show results and reward	Success
13	Retry Chapter	Success
14	Recap Score or scores average	Success
15	Logout	Success

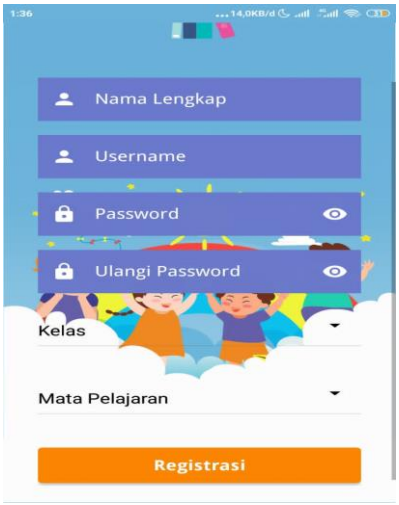

Figure 5.1: Teacher's register

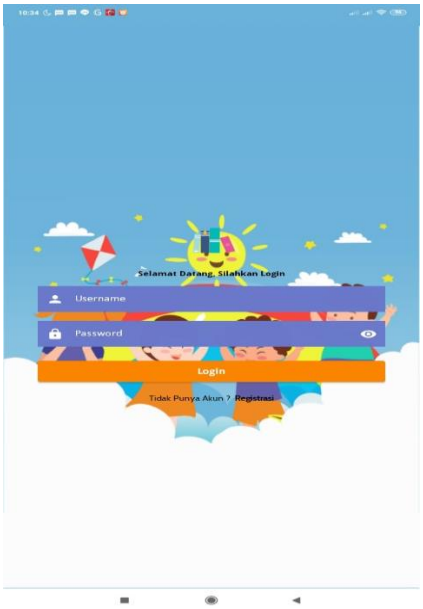

Figure 5.2: Teacher's Login Interface

Figure 5.3. Students' Data

Figure 5.4. Look up Students

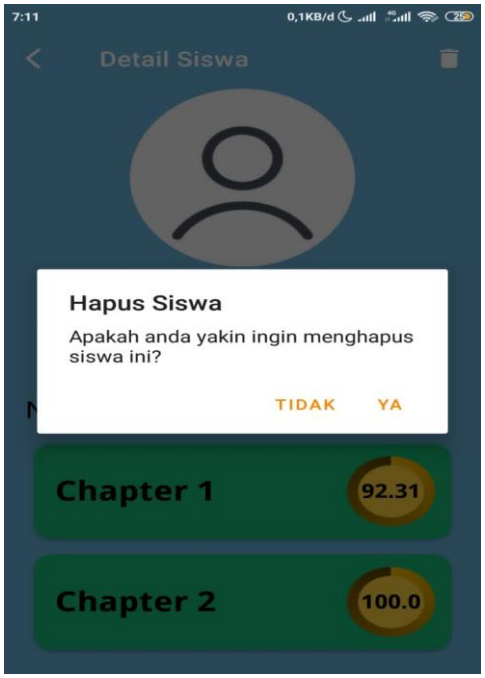

Figure 5.5. Delete Students

Figure 5.6. Upload Exercise

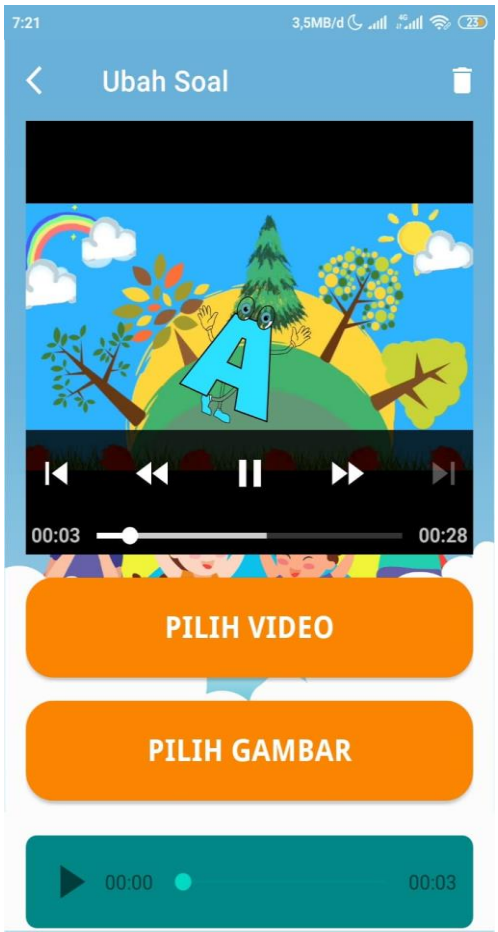

Figure 5.7. Change Exercise

Figure 5.8. Change Chapters

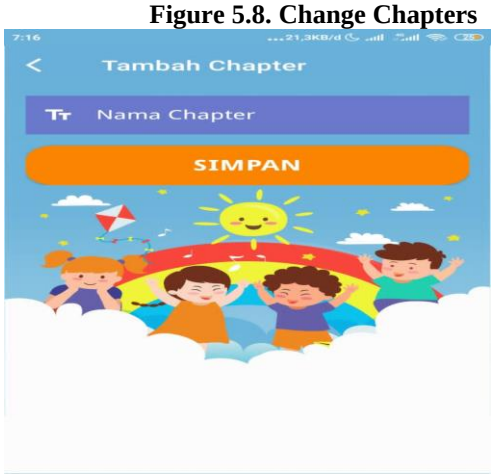

Figure 5.9. Add Chapters

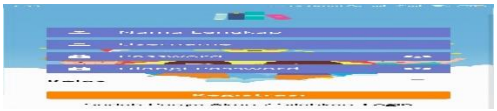

Figure 5.10. Students' Register

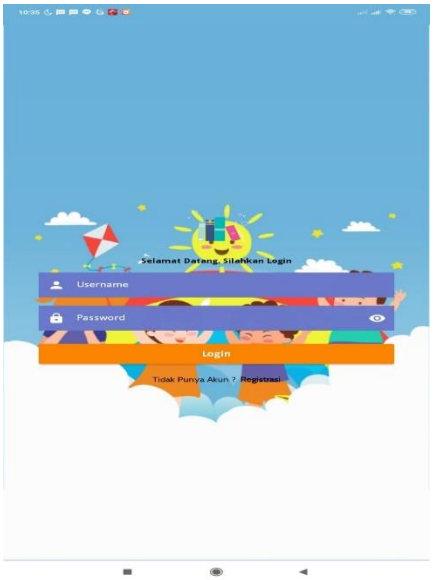

Figure 5.11. Students' Login Interface

Figure 5.12. Subject Interface

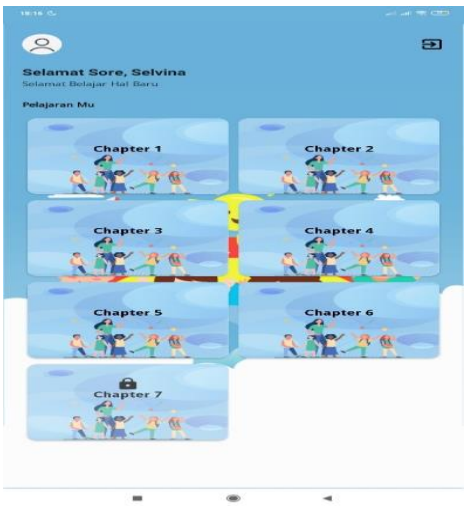

Figure 5.13. Chapter Interface

Figure 5.14. Introduction of Exercise

Figure 5.15. Exercise Interface

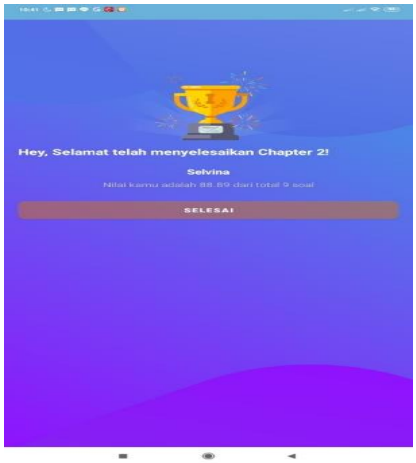

Figure 5.16. Results and Rewards

6. Conclusion and Recommendations\

6.1 Conclusion

Based on the analysis of the implementation of Android Based Learning Application Software "Learn For Fun" using the Prototyping method, the following conclusions can be drawn:

1. Based on the results of research on SLB-BC YPLAB, there are still many special needs students who have difficulty in the learning process, especially in growing the desire to learn in themselves. The existence of the system reduces the level of unwillingness to learn in children with special needs.
2. By designing the system using Android Studio, the learning and teaching process can be done through the application.
3. By creating this application, it is expected to increase the learning interest of special needs children.
4. It is expected that there is an increase in the learning quality in special needs children.

6.2 Recommendations

The following suggestions and input are expected to provide improvements in future research, namely:

a. The learning materials need to be adjusted so it can match the school curriculum.
b. The application should add a history feature.
c. The application should be updated so it can be installed on all versions of Android.

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