

## **ANDROID-BASED EDUCATIONAL GAME: RECOGNITION OF PAPUA ENDEMIC ANIMALS**

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### **Abstract**

*Papua is the largest island in Indonesia; several animals are included in the endemic group. These animals are only found in certain areas and not in other areas. To study the endemic animals of Papua, children can explore them through books that display pictures of endemic animals in Papua. Children often experience difficulties learning from books taught by teachers and parents caused by children who are less enthusiastic about participating in learning. Another problem is that learning about Papua's endemic animals through books is impractical and inefficient because thick books provide a heavy burden for children to carry. Hence, children are reluctant to study them. With educational games, media is a medium that can be used by children so that it is easy to give lessons about the endemic animals of Papua. This educational game increases efficiency and effectiveness in terms of the learning process at home and school. Learning this educational game can be done anywhere at any time so that children can learn about Papua's endemic animals innovatively and efficiently. The method used in making this educational game introducing Papua's endemic animals uses the Agile Development method. Based on testing the educational game application using the black box method, it was found that this educational game was following what was expected because there were no errors found in the menu on the system, so it worked properly.*

**Keywords:** Agile Development, Black Box Testing, Educational Games, Learning, Papua endemic animals.

## **1. INTRODUCTION**

The state of Indonesia has diversity abundance of animals. Wrong one province in Indonesia, namely Papua, also has part diversity so endemic \_ unique. Papua is the largest island in Indonesia; several animals are included in the endemic group. These animals are only found in certain areas and not in other areas. To study the endemic animals of Papua, children can study them through books that display pictures of endemic animals of Papua. Children often experience difficulties learning from books taught by teachers and parents caused by children who are less enthusiastic about participating in learning. Another problem is that learning about Papua's endemic animals through books is impractical and inefficient because thick books provide a heavy burden for children to carry. Hence, children are reluctant to study them.

In research conducted by Windawati and Koeswanti in 2021 using the ASSURE model in the development of learning media in the form of Android-Based Educational Games to Improve Learning Outcomes for Class IV Students, it was concluded that learning media in the form of

Android-Based Educational Games to Improve Learning Outcomes of Theme 7 for Class Students IV can be said to be feasible to use [1]. For research conducted by H. P.S. Muttaqin, Sariyasa, and N.K. Suarni in 2021 concluded that based on the results of the validation of interactive learning media in science subjects with the topic of animal breeding having a very good category, this was based on the results of the validation analysis of material experts who obtained an average score of 4.8, media experts with an average score of 4.8, and a small group trial of 4.5. This proves that the product of developing android-based learning media is feasible and practical [2] While the research conducted by Erri Wahyu Puspitarini in 2016 concluded that the Educational Game created teaches the development of thinking and creativity which includes learning to know animals, songs, children's songs, cheerful doodles, coloring, and the alphabet and supported by an interface that is easy to understand and operate by children aged 3-6 years [3].

Educational games are one type of media used to provide teaching in the form of games to stimulate thinking power and increase concentration through unique and exciting media. [4]. With educational

games, media is a medium that can be used by children so that it is easy to give lessons about the endemic animals of Papua. This educational game increases efficiency and effectiveness in terms of the learning process at home and school. Learning this educational game can be done anywhere at any time so that children can learn about Papua's endemic animals innovatively and efficiently.

## 2. RESEARCH METHODS

The method used in this software development is the *Agile Development method* which is an incremental development method that focuses on rapid development, software that is released in stages, reducing process overhead, and producing high-quality code and in the development process involving customers directly [5] as for

The stages used in the *Agile Development method* can be seen in the following figure:



Figure 1. Stages of *Agile Development System* (Office of the Government Chief Information Officer, 2015)

### A. Planning (Planning)

The stages of planning stages in carrying out this research consist of the following [6]:

#### 1. Literature review

The data collection method is done by studying various scientific reports, documents, or reading sources, books, and journals relevant to making the proposed application.

#### 2. Interview

Interviews were conducted to obtain information related to the research topic. Interviews were conducted with the Agape Terpadu Christian Elementary School teachers, Nabire Regency, Papua Province.

#### 3. Observation

The observations made by the researcher were carried out at the Agape Terpadu Christian Elementary School, Nabire Regency, Papua Province.

### B. Design

The next stage is the design stage, wherein it is necessary to prepare system requirements, such as hardware and software, to form an organized system. At this stage, the researcher plans and divides tasks to be done, resources needed to create the system, and makes a schedule for working on the system [7].

### C. Hardware Requirements

Hardware requirements used in this study consisted of laptops and *smartphones*.

The laptop used is the ASUS VivoBook Laptop X441UV with the following specifications:

- 1) Processor: Intel® Core™ i3 6006U Processor (3M Cache, 2.00 GHz)
- 2) Memory : 4 GB DDR4 2133MHz SDRAM
- 3) Operating System: Windows 10 Home
- 4) Display : 14.0" (16:9) LED-backlit HD
- 5) Graphic: NVIDIA GeForce 2GB
- 6) Storage : 500GB 5400RPM SATA HDD
- 7) Optical Drive: Super-Multi DVD
- 8) Card Reader: reader (SDXC/SD/SDHC)
- 9) WebCam: VGA Web Camera Built-in Bluetooth
- 10) Networking: Integrated 802.11 b/g/n or 802.11 ac

The smartphone used is the Samsung Galaxy A02 with the following specifications:

- 1) Processor: Mediatek MT6739W
- 2) Screen Size: 6.5 inch
- 3) Screen Resolution : 1600 x 720 Pixel
- 4) RAM : 3GB
- 5) Internal Memory : 32GB
- 6) Rear Camera Resolution: 13 MP Front Camera Resolution: 5 MP
- 7) USB: MicroUSB
- 8) Battery Capacity: 5000 mAh

### D. Software Requirements

*Software* requirements needed in this research are as follows:

- 1) Windows 10 64 bit Operating System
- 2) Mozilla Firefox 99.0.1 64 bit
- 3) Android Operating System
- 4) Codular
- 5) Firebase Database
- 6) Relational Rose

### E. Implementation

The implementation stage is also known as the software development stage, a series of software development processes. Software development requires prudence principles both at the design and execution stage according to the goals to be addressed. The development process is not just writing program code; it certainly includes the stage of preparing software requirements, the software design stage, and the software testing stage. And even this documentation is still included in the software development process [8]

The stages of this research design using UML (*Unified Modeling Language*). Unified Modeling Language (UML) is the standard language used to write software blueprints. UML can be used to visualize, specify, construct, and document the artifacts of software systems [9]. Meanwhile, according to research conducted by Suendri in 2018, UML is a standard specification language used to document, specify and build software [10]. The stages of UML are as follows :

### F. Use Case Diagram

A use case is something or a process representing things that actors can do in completing a job. A use case can include the functionality of

another use case as part of its internal process [11]. The *use case diagrams* in the design of this research are as follows:

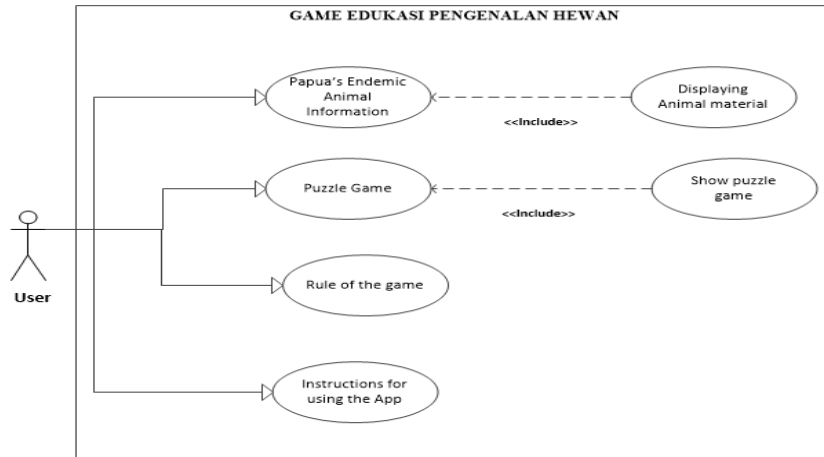


Figure 2. Use Case Diagram of Educational Games

**G. Activity Diagram**

Based on Rosa AS and Salahuddin, M *activity diagrams* describe the workflow (workflow) or activities of a system or business process or menu in the software. The emphasis in activity diagrams is on

depicting system activities or activities that the system can perform, not what actors can do [12]. The *activity diagrams* in the design of this research are as follows:

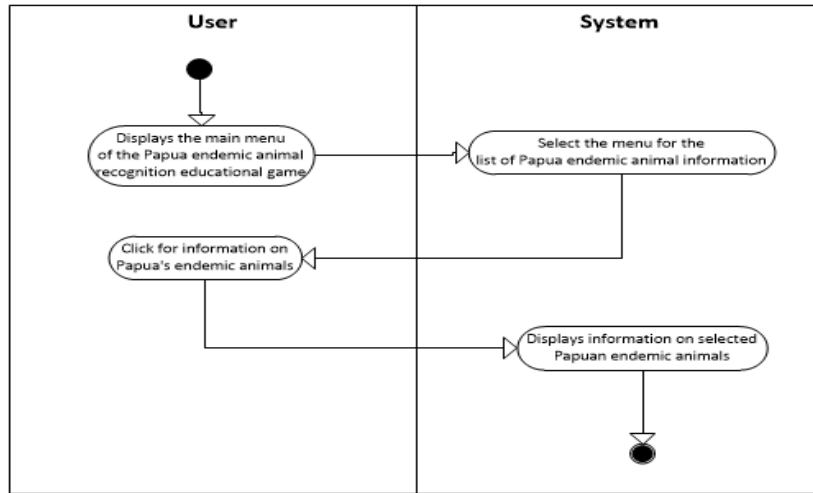


Figure 3. Activity Diagram Menu Papua Endemic Animal Information

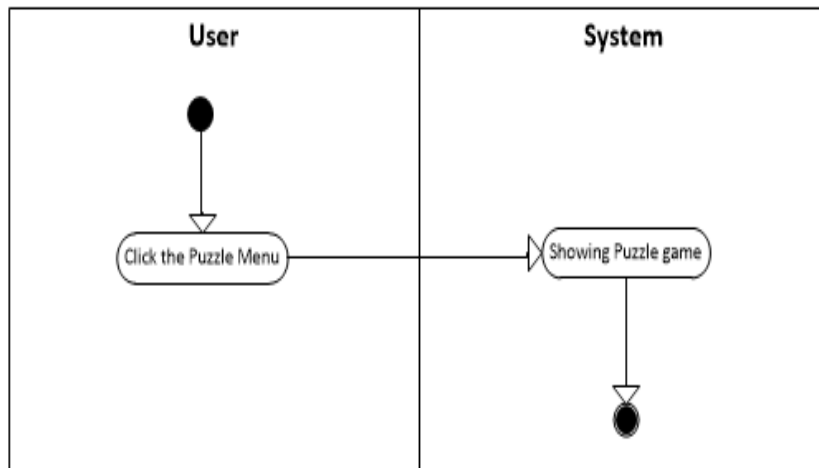


Figure 4. Activity Diagram Menu Puzzle Game

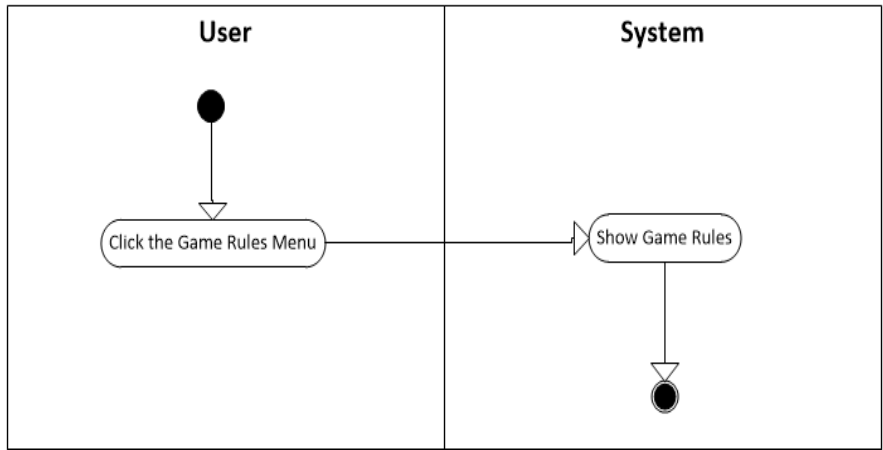


Figure 5. Activity Diagram Menu Rule Of Game

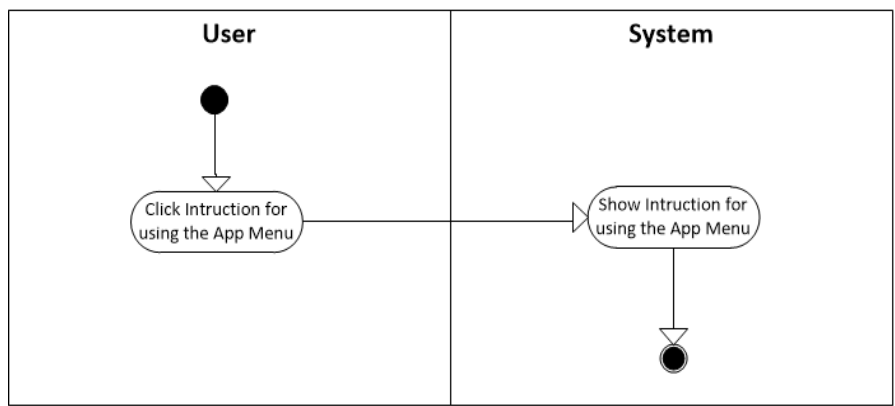


Figure 6. Activity Diagram Menu Instructions for using the app menu

**H. Sequence Diagrams**

According to Sukamto & Shalahuddin, 2018:165 explains that "Sequence Diagrams describe the behavior of objects in use cases by approaching

the lifetime of objects and messages sent and received between objects [13]. The *sequence diagram* in the design of this research is as follows:

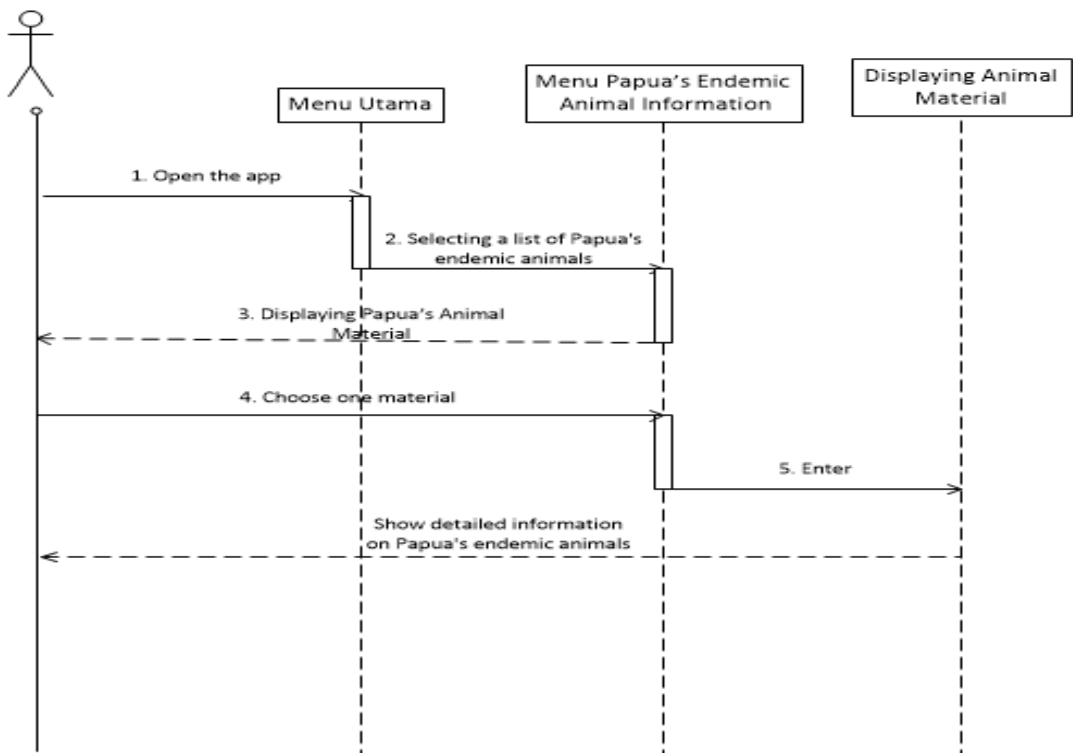


Figure 7: Menu Sequence Diagram Papua Endemic Animal Information

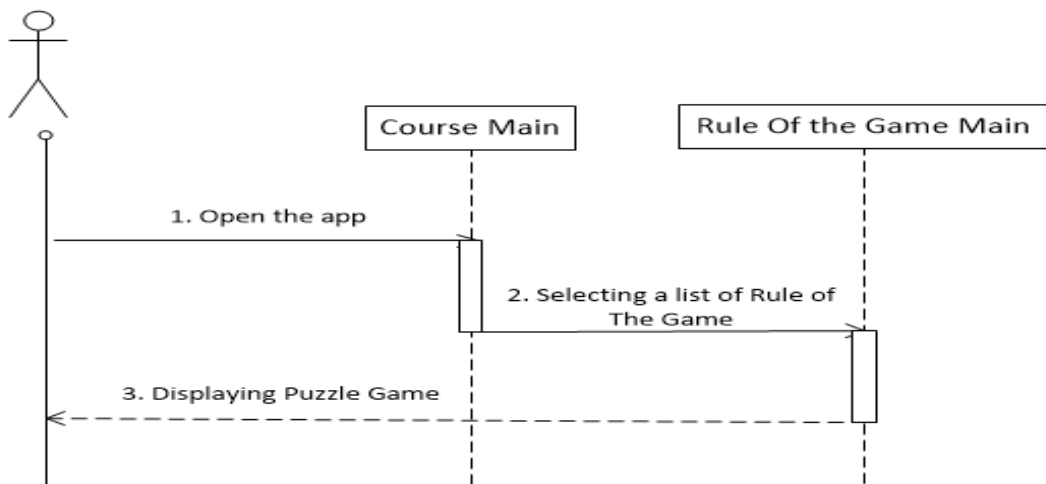


Figure 8. Sequence Diagram Menu Puzzle Game

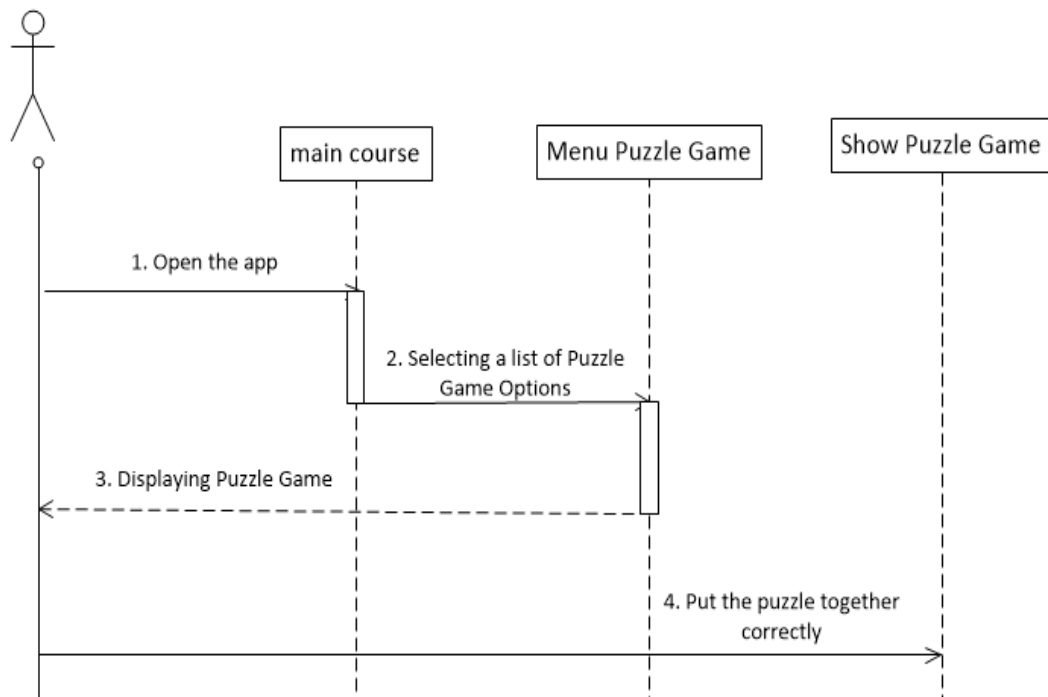


Figure 9. Sequence Diagram of the Rule of The Game Menu

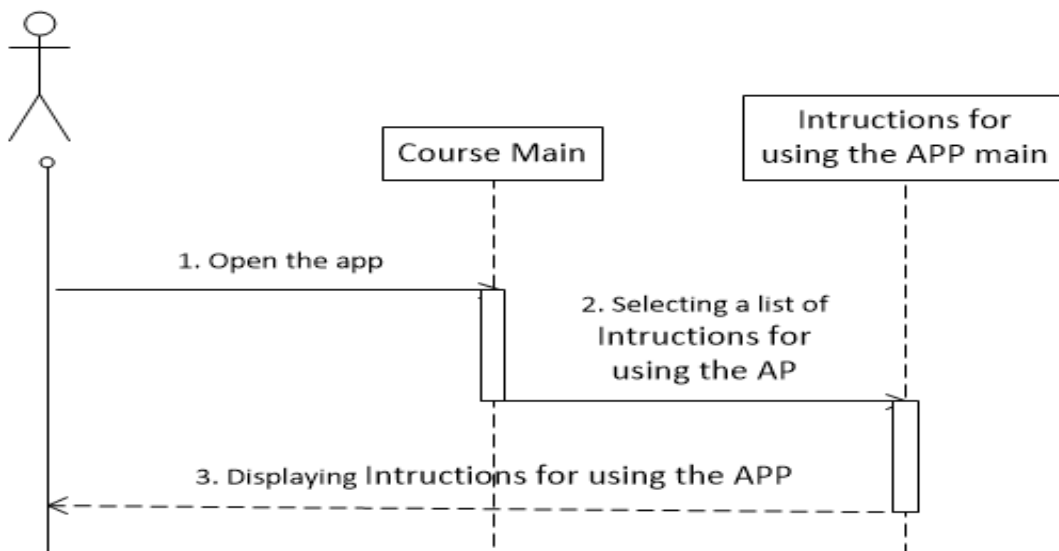


Figure 10. Sequence Diagram Menu Instructions for using APP

### 3. RESULTS AND DISCUSSION

#### 3.1. Program implementation

In this section, we will discuss the application's appearance in the introduction of the Papua endemic animal recognition game on a smartphone that aims to learn for children to recognize Papua's endemic animals.

##### 1. Splash Screen Menu

The splash screen menu is the initial screen that appears moments before the main application menu. This menu is helpful for giving the impression to the user to draw attention to the educational game that is made. The splash screens in the study are as follows:



Figure 11. Splash Screen Menu

##### 2. Main course

The main menu serves as the primary display in educational games. There are several other menus in this main menu, such as Papua's endemic animal information menu, puzzle game menu, rule of the game menu, and instruction menu for using the APP. The main menu in the study is as follows:

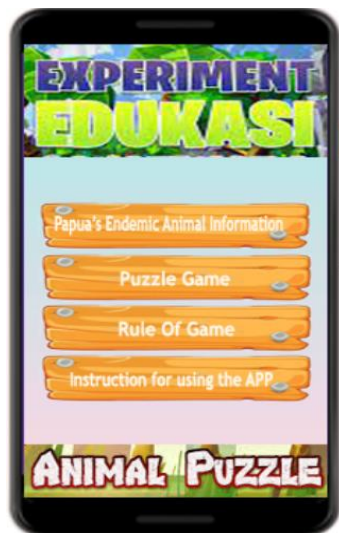


Figure 12. Main Menu

##### 3. Information Menu

The animal information menu is a menu that displays information on the Papua endemic animal information. On the front of the Papua endemic animal information menu, it shows a variety of animals. The menu for animal information in the study is as follows:

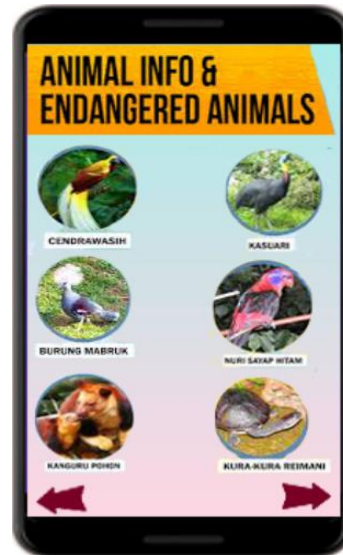


Figure 13. Information Menu

##### 4. Menu Detail Information

After we choose one of the endemic animals of Papua, the menu will display detailed information on the endemic animals of Papua in question. The detailed menu of animal information in the study is as follows:



Figure 14. Menu Detail Information

##### 5. Game Menu

Puzzle games are games that train children's brains. This game trains children in compiling pictures and trains children in accuracy and speed so that they get the best value and prizes. The menu of



the Papua endemic animal games in the study is as follows:



Figure 15. Puzzle Game Menu

### 3.2. Educational Game Application Testing

According to Fadhila Cahya Ningrum et al in 2019 explained that application testing with Blackbox Testing aims to see that the program is the same as the task of the program without knowing the program code used [14] while according to Agustan Latif in 2015 explain testing educational game applications using the black box method. According to the black box methods are used to test software without paying attention to software details [15]. This test only checks the output value based on each input value. Meanwhile, according to the black box method is how to try a program that has been made by trying to enter data on each form. This test is needed to determine if the program is running as required by the company [16]. The black box testing of Papua endemic animal education games in the study is as follows:

Table 1. The results of testing educational games using android

Test Case	Expected output	Validity	% Score
Click the Papua's endemic information button	Showing the menu displaying animal material	Y	100
Click the Puzzle Game button	Displays the show puzzle game menu	Y	100
Click the rule of game button	Displays description of the information about game rules	Y	100
Click the Instruction for using the APP button	Showing descriptions of how to use educational games	Y	100
Click the selected animal name button	Displays description of animal information	Y	100

Click the Back button on the description of the animal's name	Back to main menu	Y	100
Click the Next button on the description of the animal's name	Showing description of animal information in the first section	Y	100
Click the Next button on the animal information	Show further animal information description	Y	100
Click the back button on the animal information	Back to the animal names menu	Y	100

### 4. CONCLUSION

The android educational game application in this study can make it easier for children to learn to know the endemic animals of Papua practically since it can be studied anywhere at any time. In addition to making it easier for children to learn, this Android-based educational game can also reduce boredom for children because learning to recognize endemic animals is done by using interactive media in educational games.

Based on the results of testing the educational game for the introduction of Papua's endemic animals, using black box testing resulted in the results that the functions of the educational game did not find errors in the menu on the system because it was in accordance with the expected results.

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