Development of "Kids Learning" Educational Game as A Basic Learning Media about Geometry Materials for Kindergarten Children

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ARTICLE INFORMATION	ABSTRACT
  Authors Correspondence: Achmad Buchori Mathematic Education Universitas PGRI Semarang Sidodadi Timur St, Number 24 Semarang, Central Java, 50232, Indonesia E-mail: achmadbuchori@upgris.ac.id	The purpose of this research is to increase interest in learning for kindergarten children to recognize android-based flat shapes. This is an instructional game with both a learning and a gameplay menu. There are games on the play option such as Remembering Matches, Counting, and Guessing flat shapes using Multimedia. This study employs the Development Life Cycle (MDLC) model. The targets in this study were students of Kindergarten Mardirini Sidogemah Sayung Demak. Data processing was taken from the validation of media, materials, and user questionnaires using a Likert scale in the assessment. The results of the expert validation showed an average of 95% stating that this kid learning product was "Very Eligible" to use. Then user testing was carried out on 20 student respondents, with a percentage of 93%, very happy using this product.

Education is a method of fostering pupils' interests and skills in accordance with their potential (Darzmann & Brandl, 2018) The goal of child-friendly education is to establish a supportive learning atmosphere (conducive learning community) in which children may learn efficiently in a setting that gives a sense of security, incentives, and no risks, and provides encouragement. (F. Yulianto et al., 2018). Early Childhood Education in Indonesia is growing very rapidly and has existed for a long time even since the Dutch colonial period in 1941 and the Japanese colonial period in 1945. The PAUD institution was first known as kindergarten or more popularly as Frobel School. Frobel School founded by Friedrich Wilhelm August Frobel is the forerunner to the birth of PAUD institutions in Indonesia. (Dasriana et al., 2020) The benefits of games as a medium for playing as well as learning in Indonesia are still not common (Arpiansah, et al., 2021). The assumption of games is still only as a medium of entertainment rather than as a medium of learning. The development of early childhood is also very fast currently. This results in the increasing standard of learning in early childhood and their lack of time to play. Even though at their current age, a balance of activities is needed between learning and playing, so that the motor development of early childhood is maximized. The early age that the researcher refers to in this report is children aged 4—6 years in TK Mardirini Sidogemah (Zulkarnain et al., 2020).

From the explanation above, early childhood really needs interesting patterns or ways of learning where by utilizing current technology it can make them think that learning is a fun activity because they can play and learn at the same time. Therefore the instructional game "Kids Learning" as an early childhood learning media utilizing the Android platform. (Jayanti et al., 2018), Android can be used for a game or game whether it is educational or adventurous, while Android can also be used in tourism such as mapping an area. (Aziz et al., 2022), it is hoped that with this educational game, children can learn material that is suitable for flat shapes in everyday life.

METHOD

In this research, research and advancement approaches were used, or we called it R&D (Research and Development) (Risdianto et al., 2020). Development or Research and Development (R&D) is the method of producing educational technology through a succession of research methodologies in a cycle that goes through several stages. Based on the explanation that development research is research which used to create specific products and to enhance a product in line with the standards and requirements of the product developed to create a new product via several phases and validation or evaluation. (Arpiansah et al., 2021) Research and Development It is a research approach used to create a product and assess its viability in phases. (Munir & Wanti, 2022) Meanwhile, research and development procedures are carried out using the MDLC (Multimedia Development Life Cycle) development model. This model is one of the models for multimedia development. The multimedia development approach is divided into six stages: idea, design, material collection, assembly, validation, and dissemination (Nurdiana & Suryadi, 2017).

In this research utilizing research and development methods Research and Development (R&D) (Pangesti, 2019). Development or Research and Development (R&D) is a way of designing educational appliances that involves a series of studies utilizing various methodologies in a cycle that goes through several stages. According to the definition above, development research is research intended to generate specific products and to perfect a product that follows the references and criteria of the product made to build a new product through several phases and validation or assessment. (Arpiansah, et al., 2021)

Research and Development is a research approach for developing a product and testing its viability in phases. Meanwhile, research and development procedures are carried out using the MDLC (Multimedia Development Life Cycle) development model. This model is one of the models for multimedia development. The multimedia development approach is divided into six stages: idea, design, material collection, assembly, validation, and dissemination (Nurdiana & Suryadi, 2017).

Concept

The concept phase is used to identify the program's aims and who will employ it (audience recognition), kinds of applications, application objectives, and basic requirements. At this stage, the fundamental design rules, such as application size, goal, and so on, are also established (Syamsuryadin & Wahyuniati, 2017).

Design

Design is the process of creating thorough requirements for application organization, style, appearance, and material needs. The specs have been created. The design is thorough, such that no new decisions are required in the following stage, which is acquiring and assembling materials, but use what has been determined at the design stage. However, it is common for additional materials or application parts to be added, removed, or changed at the start of the project (Zhang et al., 2003).

Material Collecting

Material collecting is the process of gathering items based on the needs being addressed. Clip art pictures, photographs, animations, videos, music, and other resources can be accessed for free or by purchase from third parties based on the design. This stage can be completed concurrently with the assembling phase (Rahayu et al., 2018).

Assembly

The assembly process is where all multimedia items or resources are created. Designing applications depending on design storyboards, flowcharts, and navigational frameworks (Mustika et al., 2018).

Testing

After the application has been created, it is time to evaluate its capabilities and performance to ensure that they are as planned. It is checked here (recompile) whether all links, buttons, and other features work properly (Saputra et al., 2020).

Distribution

(Saputra & Febriyanto, 2019) At this level, the application will be saved in a storage device this phase might also be referred to as the assessment phase for the advancement of finished goods for them to improve. The findings of this assessment can be utilized as input for the following product's idea stage (Maulana et al., 2020).

Software & Hardware Requirements Analysis

Softwareused to support this research are (Saputra & Febriyanto, 2019) Construct 2 r280, Android studio, CorelDRAW 2021, Google Audio converted, Windows 10 64-bit Operating System (Djo & Suhendi, 2021). Hardwareused to support this research is Random Access Memory (RAM) 4 Gigabyte recommendation 8 Gigabyte, 256 Gigabyte SSD Hard Disk, Android Smartphone with Android 12 operating system (Fontaine et al., 2021).
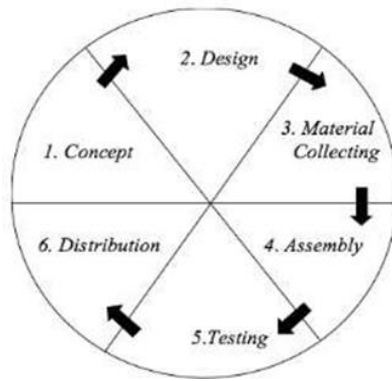
Figure 1. MDLC

Instrument Type

(Syamsuryadin & Wahyuniati, 2017) The research instrument is employed to calculate the value of the variables under consideration. As a result, the number of instruments required for study will be determined by the number of variables. Questionnaires for media and material experts. The aspects assessed by media expert validation are as follows. Then it is transformed into a percentage interval conversion.

Table 1. Expert Questionnaire Likert Scale

Information	Score
Strongly Agree (SA)	4
Agree (A)	3
Disagree (DA)	2
Strongly Disagree (SDA)	1

Table 2. Assessment Aspects

No	Rated aspect
1	General Aspect
2	Content Feasibility Aspect
3	Application Eligibility Aspect
4	Content Feasibility Aspect

Table 3. Interval Percentage Scale

No	Percentage	Criteria
1	0% - 25%	Very Inappropriate
2	26% - 50%	Not feasible
3	51% - 75%	Worthy
4	76% - 100%	Very Worthy

(Mardhatillah & Trisdania, 2018) In the expert test, the percentage of each item is said to be successful or feasible if it is in the 76% - 100% interval with the "Very Eligible" criteria, 51%-75% with the "Eligible" criteria, 26%-50% with the "Not Eligible" criteria, and 0% - 25% with the criteria of "Highly Unfit". Then the score of each aspect is calculated using the formula

$$\text{Presentation} = \frac{\sum Jumlah\ skor}{\sum skor\ maksimal} \ x\ 100\%$$

Respondent Questionnaire Lembar

(A. Yulianto, 2020) The respondent's questionnaire sheet uses the Guttman scale which includes answers "yes/no", "true/false", "sure/not sure", "agree/disagree". In this study using the answer "agree / disagree".

(B.

Table 4. Guttman Scale Score

Answer	
Agree	1
Don't agree	0

Then the score of each aspect is calculated using the formula:

$$Presentation = \frac{\sum jumlah\ skor\ "Setuju"}{\sum skor\ maksimal} \times 100\%$$

RESULTS

In research on the development of educational game applications, it aims to make the application as a medium for learning to recognize attractive flat shapes, create easy-to-understand learning patterns so that it can improve the learning process about flat shapes, design and create educational games for Android-based flat shapes. (Damayanti et al., 2020). The development of this application employs the Research & Development (R&D) method. The educational game design model or approach utilize the MDLC (Multimedia Development Life Cycle) method which consists of 6 stages, namely concept (concept), design (design), collecting material (material collection), assembly (making), testing (testing) and distribution (distribution) (Munir & Wanti, 2022).

The first stage is the concept stage. Researchers carry out unstructured observations and interviews with classroom teachers in kindergarten, this research was conducted at Mardirini Sidogemah Sayung Demak Kindergarten. Based on unstructured observations, researchers found problems with unsatisfactory learners' learning objectives. According on observations obtained by the media utilized in the learning experience, students may only observe in the book utilizing worksheets and magazines. Therefore, the researcher determines the needs analysis, namely the need for producing instructional media that is entertaining and not monotonous for learners (Arpiansah et al., 2021). The second process is the design stage, the design stage is the process of designing educational games which includes making flowchart designs, designing navigation structures, designing storyboards, designing use case diagrams and designing activity diagrams (Dilago et al., 2021). The third stage is the stage of collecting material (collection of material). At this step, materials are collected based on their requirements. Learning materials, photos, and audio are the outcomes of the material collecting step. In addition, data collection needs are software and hardware. For data, software needs include, Corel draw X7, construct2, android SDK. Then for hardware, the HP Laptop 14 – cm0xxx 4GB 64-bit RAM, android smartphone (Octaviani & Aryapranata, 2019).

The fourth stage is assembly (manufacturing), this manufacturing stage is based on the storyboard design that has been made, this manufacturing stage goes through the materials that have been collected such as audio, images, and materials that will later be used as applications. (Rizal et al., 2019). The fifth stage is testing, The testing step is completed by executing the program and determining whether or not there are any issues; this testing stage is completed by media expert validation and replies, validation is carried out by 3 media expert validation, material and learning design experts. The sixth stage, namely distribution, at this phase the researchers stored in apk format after storing educational games, they were distributed to classroom teachers in kindergarten to be used as teaching materials and educational games were distributed to students as a medium for learning to recognize flat shapes (Mustika, 2018).

The data from the feasibility test conducted by media experts obtained the general aspect of 100%, the content feasibility aspect 91.67% and the application feasibility aspect 91.67%, the content feasibility aspect 91.67%. From the assessment of the four aspects, the final assessment for the feasibility carried out by media experts was 91.67% so that it was categorized as very feasible. While the data analysis conducted by the guardians of the students of TK Mardirini Sidogemah Sayung Demak obtained 93% results so that it was categorized as very feasible. so that media applications recognize flat shapes can be categorized as very feasible to use (Setianingrum & Azizah, 2021). Depending on the research, it can be demonstrated that this application is extremely feasible and efficient to utilize. This it can be concluded that the application of recognizing flat shapes can be applied and used as a student learning aid. The application development is as follows:

Main Page

On the main page, there is an inscription on the loading process and after that a start button appears and a description of the benefits regarding this "kids learning" application, and below that there is a start button and when you press the start button you will be in the main menu in which there are two buttons, namely the button game materials and buttons.

Figure 2. Game Main Page

Main Menu

There are six options on the main menu that have their respective functions. Key functions on the main menu include:

1. Speaker serves to show sound or music when opening the application.
2. About, shows the profile of the application maker.
3. Instructions, serves to display a page that contains how to use the "kids learning" application.
4. Material menu serves to display the material in the "kids learning" application.
5. Game menu serves to display the games in the "kids learning" application.
6. Exit, serves to exit the application.

Figure 3. Game Main Menu

About menu, on this information page displays the profile of the creator of the educational game application "kids learning".

Instruction Menu

This guide page contains instructions and steps on how to play the game in the "kids learning" educational game application. And in it there are several steps and ways to make it easier for children or companions to be able to play the educational game application "Kids Learning" " this.

Figure 4. Game Hint Menu

Material Menu Page

On the menu page, this material displays 8 materials containing number recognition, letter recognition, colour recognition, fruit recognition, flat shape recognition, animal recognition, vehicle recognition, planet recognition, children or their companions can choose learning material that will be studied by children – the child.

Figure 5. Game Material Menu Page

Language Menu Material Menu Page

On the material menu page in the material there are 2 languages, namely English and Indonesian, children can choose to learn to recognize letters, recognize numbers, recognize colours, recognize fruit, recognize flat shapes, recognize animals, recognize means of transportation, and recognize planets by using These 2 languages, namely English and Indonesian, are symbolized by their country flags (Krisnawan, 2015).

Figure 6. Page Menu Material Choice Language

Game Page

On this game page there are 4 games, including memory match, which is a game to hone a child's senses of memory, counting, which is a game to count how many objects are in the problem, guess the colour, which is a game that guesses the colour of an object or what is in the problem game, guess the animal, which is a game that matches the animal pictures in the game.
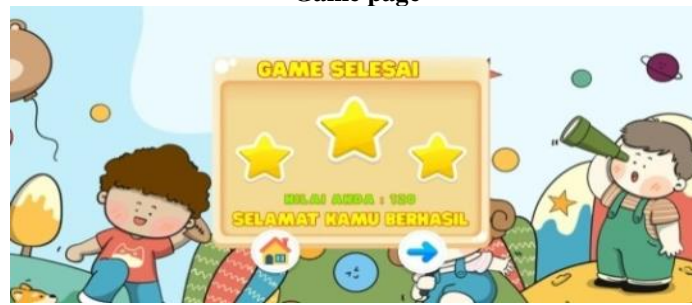

Figure 7. Game Page

Game page

Figure 8. Game Value Page

On the next game page, namely the game score at the end of the game, this score or value is taken how well you did the questions in the game and how fast you answered the questions in the game, which are symbolized in the form of stars and total score produced (Yunus et al., 2015).

CONCLUSION

An Android-based "kids learning" educational game has been produced using construct 2 which has met the criteria for being feasible, practical, and effective for use as a "kids learning" learning medium at the kindergarten level, according to the outcomes of media and material experts' evaluation, where media experts get a feasibility value of 91.67% whereby it is embedded in the "Very Eligible" criteria for requirements. While the results of the material expert score got a value of 91.67% whereby it is embedded in the "Very Eligible" criteria for use, then the "kids learning" application was declared valid, then the results of user trials with instruments using the Guttman scale were 20 respondents. The results of the "kids learning" application obtained results of 93% whereby it is embedded in the "Very Eligible" criteria for requirements and the application was effective.

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