

# The Learning Media Application "BELIPARU" Oriented Towards the Mastery of Fifth-Grade Students' Concepts of the Water Cycle Material

Fanny Destiani<sup>1\*</sup>, Atep Sujana<sup>2</sup>, Ani Nur Aeni<sup>3</sup> 

<sup>1,2,3</sup> PGSD, Universitas Pendidikan Indonesia, Sumedang, Indonesia

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## ABSTRAK

Rendahnya tingkat penguasaan konsep siswa SD di Indonesia terutama pada pelajaran IPA berdampak pada rendahnya hasil belajar, antusiasme, serta semangat siswa dalam mengikuti kegiatan belajar mengajar. Sehingga untuk memaksimalkan proses pembelajaran, guru harus mulai memanfaatkan penggunaan media. Adapun tujuan dari penelitian ini yakni untuk melihat keefektifitasan media aplikasi "BELIPARU" yang berorientasi pada penguasaan konsep siswa kelas V. Penelitian ini tergolong kedalam jenis penelitian pengembangan yang dikembangkan menggunakan model borg and gall, dengan empat tahapan penelitian yang terdiri dari tahap pengumpulan ide dan referensi, tahap pembuatan produk, tahap validasi media dan validasi materi, tahap revisi produk dan tahap uji coba. Subjek uji coba dilakukan kepada siswa sebanyak 29 siswa pada kelas V. Metode pengumpulan data ini dilakukan melalui observasi, instrument test tulis berupa soal pretest dan posttest dan angket tertutup siswa. Data yang diperoleh dalam penelitian ini kemudian dianalisis dengan teknik analisis deskriptif-kuantitatif melalui aplikasi SPSS, yang kemudian dijabarkan secara menyeluruh menggunakan deskripsi. Hasil analisis penelitian menunjukkan bahwa uji ahli media menghasilkan persentase 92.5% dengan kategori sangat baik, sedangkan hasil dari ahli materi menghasilkan persentase 90.6% dengan kategori sangat baik, meskipun ada sedikit revisi minor pada validator. Selanjutnya hasil uji coba kegiatan pretest menunjukkan rata-rata 22,24 dan hasil pengujian kegiatan posttest menunjukkan rata-rata 64,31. Berdasarkan hasil tersebut maka dapat disimpulkan bahwa aplikasi berbasis android sangat cocok digunakan pada proses pembelajaran peserta didik terutama dalam meningkatkan penguasaan konsep.

## ABSTRACT

The low level of mastery of concepts by elementary school students in Indonesia, especially in science subjects, impacts students' low learning outcomes and enthusiasm for participating in teaching and learning activities. So to maximize the learning process, teachers must start utilizing the use of media. This study aims to see the effectiveness of the "BELIPARU" application media, which is oriented towards mastering the concept of fifth-grade students. This research belongs to the type of development research developed using the Borg and Gall model, with four research stages consisting of the idea gathering and reference stages, product manufacturing stage, media validation stage and material validation stage, product revision stage, and trial stage. The test subjects were conducted on 29 students in class V. This data collection method was carried out through observation, written test instruments in the form of pretest and post-test questions, and closed questionnaires for students. The data obtained in this study were then analyzed using descriptive-quantitative analysis techniques through the SPSS application, which were then thoroughly described using descriptions. The research analysis showed that the media expert test produced a percentage of 92.5% in the very good category. In comparison, the results of the material experts produced a percentage of 90.6% in the very good category, although there was a slight minor revision in the validator. Furthermore, the results of the pretest activity trials showed an average of 22.24, and the results of post-test activity testing showed an average of 64.31. Based on these results, Android-based applications are very suitable for students' learning process, especially in increasing mastery of concepts.

\*Corresponding author

E-mail addresses: [fannydestiani123@upi.edu](mailto:fannydestiani123@upi.edu) (Fanny Destiani)

## 1. INTRODUCTION

Humans are born with inherent rights and obligations to live a more decent life. One of the rights that must be given to them is the right to education. Every human being is also required to receive education for nine years, from the age of 7 to the age of 15 (Octavianti, 2023; Sari & Khoiri, 2023). Through education, humans will become dignified, well-educated, intelligent, and successful and get a better life (Sujana, 2019; Susilowaty et al., 2017). Learning will produce output in the form of learning outcomes. In general, changes in psychological aspects are ideal learning outcomes (Diantoro et al., 2021; Pujiyanto et al., 2020). One aspect that determines the quality of learning outcomes is the extent to which students understand learning material cognitively (Fardiah et al., 2019; Nuryati & Darsinah, 2021). The quality of learning outcomes is seen from each student's ability to master learning material per subject. Usually, the activity of mastering material in science subjects is said to be mastering concepts (Febriani, 2017; Munirah et al., 2022). Learning outcomes are also directly proportional to understanding the concepts educators teach. High learning outcomes result from high mastery of concepts as well. Concept mastery is an individual's ability to recognize, understand, and absorb any material taught or studied (Siahaan et al., 2020; Widia et al., 2020). It is then related to the ability of students to absorb the material provided by the teacher or students can understand what they have seen and read.

It is just that the reality on the ground shows that students' mastery of science concepts in Indonesia still needs to improve (Gunawan et al., 2021; Handayani et al., 2018; Hanif et al., 2019). The low mastery of students' concepts is due to decreased motivation to learn (Pratiwi et al., 2018; Siahaan et al., 2020). It aligns with the observations and interviews conducted at SDN Ciganitri 1. The results of observations and interviews show that fifth-grade students' science knowledge competence still needs to improve. The problem is caused because students tend to get bored quickly in following the learning process and need more focus in listening to the material presented by the teacher. Teachers' lack of use of interesting learning media also causes low competence in science knowledge. In practice, the teacher only uses conventional media, such as books and pictures, to explain learning material. Such learning media certainly gives the impression that it could be more attractive and easier for students to understand. If left unchecked continuously, problems regarding the low competence of students' science knowledge will impact not achieving learning goals. So to overcome this, teachers are required to be more creative in carrying out learning.

One way that can be done to overcome these problems is to utilize the use of learning media. In educational circles, learning media has become a companion for educators. Educators use various kinds of media to help convey material to students. Learning media is considered very important as a tool that can support success and improve the quality of learning (Nurfadhillah et al., 2021). Learning media used in the learning process must pay attention to the characteristics of students and must be able to bring a sense of fun and coolness to students (Dapitra et al., 2022; Nafisah, 2021). Learning media consists of physical tools that are used in delivering the content of learning materials such as books, tapes, video recorders, photos, computers, and many others (Nursyaida & Hardiyanti, 2020; Widhayanti & Abduh, 2021). PowerPoint is the type of learning media currently popular in education circles, especially elementary schools. It is because most schools are equipped with supporting devices to use these learning media.

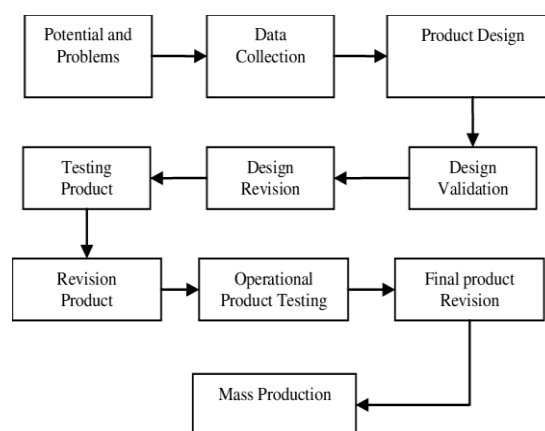
PowerPoint is a tool for a teacher to explain a material using a projector (Herlina & Saputra, 2022; Lelamula et al., 2022). PowerPoint usually only contains the material's core topic, which is then explained by the teacher (Nugraha et al., 2021; Sarwono, 2022). PowerPoint is a software that can be used to compile presentation material easily and effectively and is widely used for presentation, teaching, and animations (Damayanti & Qohar, 2019; Hikmah & Maskar, 2020). PowerPoint can be an interactive learning media because its various facilities can support the creation of interactions between students and learning media (Candra et al., 2020). PowerPoint as a learning medium in elementary schools has been widely used and has given positive results. However, the application of PowerPoint as it is today still has drawbacks as it is still in the form of an ordinary template which is less attractive to students, especially in elementary schools because when viewed from the characteristics of elementary school children, they prefer more interactive concepts starting from lots of pictures then bright colors and only a little reading but still they understand so that the use of PowerPoint as a medium can be modified into a learning application. The application of PowerPoint media as an Android application will improve the quality of education. It is evidenced by increased student willingness to learn, a better understanding of concepts, higher student enthusiasm, and other benefits.

Several previous studies have revealed that using Android applications can increase students' willingness and learning concepts for better learning outcomes (Aeni et al., 2022). The results of other studies reveal that learning using the Renderforest application is the most effective method for increasing student learning motivation (Wulandari & Putra, 2021). Further research revealed that android-based learning media could improve students' literacy skills (Rahayu et al., 2022). Based on some of these

research results, the Android application media effectively improves learning outcomes and student motivation. In previous studies, no studies specifically discussed the development of the "BELIPARU" application learning media oriented towards mastery of fifth-grade students' concepts on the water cycle material. So this research is focused on this study to see the effectiveness of the media application "BELIPARU", which is oriented toward mastery of fifth-grade students' concepts.

## 2. METHOD

This research belongs to the type of development research that was developed using the Borg and Gall model. The Borg and Gall research method was chosen because it refers to an approach used to conduct research, design, production, and test the validity of products that have been developed. This development research was carried out in six stages of research which consisted of: analyzing the problems or needs to be solved by the product to be developed, collecting data related to these problems or needs, designing products taking into account previously collected data, testing product validity to ensure the resulting product is as expected, revises the product based on the validator's criticisms and suggestions, and conducts product trials to ensure its effectiveness. The schematic of the R&D method can be seen in Figure 1.



**Figure 1.** Steps for Using the R&D Method

The data for this study were sourced from data collection at SDN Ciganitri 1, an elementary school located in Bandung Regency. Students who participated in this study amounted to 29 people from grade five. Data collection in the study was carried out using observation, interviews, and tests, with research instruments in the form of written tests and questionnaires. Written tests in the form of pretest and post-test questions were administered to students to determine the success of students' mastery of concepts in science subjects. At the same time, the questionnaire is conducted to the validator to analyze the feasibility of the product that has been made. In addition, students are also given a questionnaire to evaluate the products that have been used and provide feedback regarding the effectiveness and usefulness of these products. The research instrument grids can be seen in Table 1 and Table 2.

**Table 1.** Research Instruments

No	Review	Criteria
1.	Reviews Material Expert Test	<p>The contents of the application are by the material in general</p> <p>The content of the material is by the achievement of Basic Competency</p> <p>The content of the material is by the depth of the material, which includes understanding, examples, exercises, and interactions between concepts</p> <p>The accuracy of the introduction and presentation concept is by the concept of the water cycle for fifth-grade students</p> <p>The accuracy of the text is to the concept of the water cycle for fifth-grade students</p> <p>The accuracy of the practice questions corresponds to reality and can improve fifth-grade students' mastery of concepts</p> <p>The accuracy of the images is appropriate and can improve fifth-grade students' mastery of concepts</p>

No	Review	Criteria
2.	Reviews Media Expert Test	The contents of the material can encourage students' curiosity about the water cycle material
		The application cover design is by the contents of the material
		The appearance of the layout in the application is appropriate
		Application design according to the characteristics of students
		The color composition in the application is by the characteristics of the students
		Images and text are the sizes they should be
		The images on the application correspond to the concept of the material
		Images in the application make it easier for students to understand the concept
		The tidiness of the text and image layout is appropriate
		This media application facilitates students in the learning process
This media application facilitates students to play an active role in learning activities		

**Table 2. Student Test Instruments**

No	Aspect	Item Number	Number of items
1.	Understanding the Water Cycle	1, 2	2
2.	Understanding the Benefits of Water	3, 4	2
3.	Phenomenon Understanding	5	1
<b>Total</b>			<b>5</b>

The data obtained from the research results were then processed quantitatively through a quantitative-descriptive approach. The quantitative method is used in research to collect, analyze, and interpret data by calculating or using statistics. This research produces numeric data, which will be processed using a mathematical formula to calculate and analyze the results of product validation tests and students' ability to understand the concepts of science subjects. The analysis technique used in the expert test and questionnaire is a percentage. The decision-making provisions can be seen in [Table 3](#).

**Table 3. Achievement Level Conversion**

Achievement Level	Classification	Description
81-100	Very good	No need to revise
66-80	Good	No need to revise
51-65	Enough	Revised
35-50	Less	Revised

### 3. RESULT AND DISCUSSION

#### Result

The teaching aid developed is an application media that is useful as a tool for students to understand the concepts being taught. The application consists of material, practice questions, quizzes, and games connected to the web. Developing this application consists of several stages adapted to the R&D method: the idea and reference collection stage, the product manufacturing stage, the media and material validation stage, the product revision stage, and the trial stage. The results of each stage of development are as follows: first, collecting ideas and references begins by analyzing the conditions around the students by looking at the needs of students either by observation at school or through literature review. It was found that students' mastery of concepts was still low, and the digital era had begun to develop. One of the observation activities was carried out at SDN Ciganitri 1 by interviewing the teacher or students. In learning science subjects, students need help mastering concepts related to Basic Competency 3.8, analyzing the water cycle and its impact on events on Earth and the survival of living things. The indicators that students must understand are the stages of the water cycle and how water is used for life.

Second, the product manufacturing stage is carried out after the problem is found, followed by making a product that is adapted to the digital era but still pays attention to the needs of its students. In making this application, the design is made as attractive as possible, complemented by music, exercises, and games that can attract students' attention. The existence of games in this application is a way of assessing that can restore memory, give a good impression on students' brain memory and attract

students' interest. The creation of this product begins with making a background design using the Canva application. After the design is complete, it is continued by using the SAC application to insert buttons and apply effects to touch the buttons like an application in general. Apart from that, the SAC application also includes music as an addition to complement this application. The material in this application product is taken from student theme books, and some are taken on educational websites so that the material presented can be by basic competencies. The game section of the application is also linked to a web word wall. The description of the media products developed can be seen in [Figure 2](#).



**Figure 2.** Application Media Products

Third, at the validation stage, the media and application materials that have been made will be assessed for their feasibility. It is done to ensure the feasibility of the application being developed as a tool for mastering concepts in science subjects. Determining the feasibility of this product which is the initial benchmark is the validation of material and media experts. The media review standard refers to quality, including instructional quality, technical quality, content quality, and objectives. In the media validation and material validation stages, the researcher will submit the application media made to the validator to assess its feasibility. In this case, the assessment was carried out by lecturers from the Indonesian University of Education who are experts in their fields by filling out closed questionnaires that researchers have prepared. The results of the feasibility assessment from the media expert validation yielded 92.5% with very good information then the feasibility assessment results from the material expert validation yielded 90.6% with very good information. After being validated by the validator, several notes were obtained in the form of criticism and suggestions to evaluate the application media. It is carried out at the product revision stage, even though the validation results obtained have a fairly high percentage value. Criticism and suggestions from test experts can be presented in [Table 4](#).

**Table 4.** Expert Product Revision

Comment	Suggestion
The application media is suitable for use, but with a few notes (In terms of design, color, and images are good. Of course, it will keep students' motivation awake. In terms of presentation of the application material, it should be more interactive. I like the game part. Of course, this is the part I'm waiting for -waited by students.	Several bugs need to be fixed. In the section on the benefits of water for animals (lastly), you can't press the back button and have to go to the main screen. You should be able to press the back button. In water phenomena, there should be indications that hail, floods, acid rain and landslides, evaporation, condensation, precipitation, and infiltration sections can be suppressed and display explanations. Of course, this part will be missed by ordinary people, making this application have to be used with/guidance/teacher's directions.

Fourth, after improving the criticisms and suggestions from the validator, the next step is testing or implementing the product being developed. This product was implemented in grade five at one of the elementary schools, SDN Ciganitri 1, with 29 students. This trial phase and learning activities in the classroom are carried out. The learning activity begins with giving pretest questions to students, which must be worked on for 15 minutes. After the pretest, it is continued by installing an application on each

cellphone brought by students. Researchers carry out learning with a student center learning approach in their learning activities. The student center learning approach is one of the learning activities that make students the main role to be responsible, active, and independent in the learning process. So according to the approach used, students are allowed to explore the application independently first by being given 30 minutes. The researcher directs students to joint discussion activities about difficulties or things they need help understanding about the application. In discussion activities, students can express opinions or ask questions about the material or its application. In addition, the researcher also installed an infocus to explain things that were difficult according to students. After the discussion activities are over, it is followed by giving directions to carry out the quiz in the application. The time allotted to complete the quiz is 15 minutes.

Students who have completed the quiz will be free to access games that can be played for 10 minutes. After that, the researcher asked four people to explain what was obtained and felt during learning using the "BELIPARU" application media. Furthermore, the researcher and the students concluded today's activities and closed by giving post-test questions to students that had to be done in 15 minutes. Giving a pretest and post-test aims to measure students' ability to master the concept of science material, especially in the Water Cycle material, using the "BELIPARU" application. The results of the pretest and post-test questions were processed using the SPSS application. Because this study involved a sample of less than 50 and there was a relationship between the two data, therefore, a normality test was required before carrying out other statistical tests. The Shapiro-Wilk test is a normality test developed by Shapiro in 1958 and 1968 and is used to simulate data with a sample size of less than 50. The normality test results with the Shapiro-Wilk test can be seen in [Table 5](#).

**Table 5. Shapiro-Wilk Normality Test**

	Tests of Normality					
	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	0.158	29	0.061	0.961	29	0.356
Posstest	0.126	29	0.200*	0.947	29	0.153

Based on the data in [Table 5](#), it can be seen that the sig value in the pretest and post-test shows more than  $\alpha = 0.05$ , which means that if it fits the test criteria, then the data is declared as a normal data distribution. After confirming that the data were normally distributed, a trial was carried out using a 2-sample t-test to see if there were significant differences in student's mastery of concepts before and after using application media in the Water Cycle Science material. The test results show that sig = 0.000 < 0.005, which means that according to the test criteria, it can be said that there is a difference in the results between the results of the pretest and the results of the post-test. The analysis results show a difference between the pretest and post-test average values, as seen in [Table 6](#).

**Table 6. Average Pretest and Post-Test Results**

		Paired Samples Statistics			
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	22.24	29	7.628	1.417
	Posstest	64.31	29	22.863	4.246

The data in [Table 6](#) shows that there has been a significant increase in value. In the pretest activity, the average student score was 22.24. After that, in the post-test activity, the average student score was 64.31. From these data, it can be concluded that the average score on the post-test activity is better. With this, one can be sure that using learning media in the "BELIPARU" application significantly increases students' mastery of concepts. Apart from the results of the average student scores in the pretest and post-test activities, this increase can also be identified through closed questionnaires which can be seen as long as students participate in learning with great enthusiasm and enthusiasm in using application media which is relatively new, especially at that school. At the beginning of giving the pretest, students had difficulty filling it out. However, after learning takes place using this application media, students can follow it enthusiastically, enthusiastically, and confidently. This application media contains material about the water cycle. The material presented in the application is adapted to students' character and is made, and this application also contains attractive images. The reason students are given a closed questionnaire

is to find out the views and opinions of students regarding the media they have used. Further, the results of the questionnaire can be seen in [Table 7](#).

**Table 7. Student Assessment Closed Questionnaire**

Indicator	Rated aspect	Agree	Percentage
During Learning Activities	I can operate the "BELIPARU" application that has been installed on my cellphone	29	100%
	I am enthusiastic while participating in learning activities with the "BELIPARU" application media	28	97%
	I actively provide opinions during discussion activities	25	86%
	I am more confident in giving opinions during discussion activities	25	86%
	I actively ask questions during discussion activities	24	83%
	I can answer all questions in the "BELIPARU" application media	25	86%
After Learning Activities	I understand the material presented in the application media	29	100%
	I complete the assigned tasks on time	25	86%
	I am more enthusiastic about learning after participating in learning activities using the "BELIPARU" application media	25	86%
	I feel happy with learning activities that use the "BELIPARU" application media	27	93%

Based on the closed questionnaire table, students agree in every aspect assessed overall. Of the 29 students, there were 29 students (100%) agreed that they could operate the "BELIPARU" application installed on their cell phones. All students agree that they can operate media applications. These results are then adjusted to Piaget's theory which states that elementary school students reach the concrete operational stage at the age of 11 and are considered mature enough to use logical thinking or operations in the form of physical objects. Then 28 students (97%) were enthusiastic while participating in learning activities using the "BELIPARU" application media. As many as 25 students (86%) were more confident and active in giving opinions in discussion activities during learning. However, only 24 (83%) of the 29 students agreed they were more active in asking questions in learning activities. Then 25 students (86%) agreed they could answer all the questions in the "BELIPARU" application media. After the learning activities, 29 students (100%) stated that they understood the material presented in the application media. Then 25 students (86%) were able to complete assignments on time and stated that they were more enthusiastic about learning using the "BELIPARU" application media. As many as 27 students (93%) felt happy when learning activities used the "BELIPARU" application media. Based on the percentage results from closed questionnaires, it can be seen that the success of the "BELIPARU" application media in increasing students' mastery of concepts in science subjects, especially the Water Cycle material in fifth-grade elementary school.

## Discussion

Based on the data analysis that has been done, Android-based applications are very suitable for use in students' learning process, especially in increasing mastery of concepts. It relates to students' preference to follow learning by using learning media, especially applications ([Ardiansyah & Nana, 2020](#); [Bulkani et al., 2022](#)). Using applications in the learning process makes students more focused and able to store this media longer without having to pile up or lose it because the media application will be installed forever on Android. The existence of an application is also inseparable from the presentation of games in it. Game media can further increase students' motivation, enthusiasm, and mastery of concepts ([Byusa et al., 2022](#); [Rais et al., 2018](#)). The use of application media will change the difficulties encountered when explaining directly. Applications equipped with pictures and games can assist in understanding concepts to increase student achievement ([Liu et al., 2020](#)). It was further explained that using applications in teaching and learning activities can produce significant output related to conceptual understanding and creative thinking ([Nurhamidah et al., 2022](#)).

Application-based interactive learning media is suitable for learning activities, impacts students' self-concept, and significantly increases mastery of concepts ([Tarmidzi et al., 2022](#); [Wulandari & Putra, 2021](#)). The use of this application can assist teachers in presenting a variety of learning activities and increasing students' willingness to learn. In addition, students who are more accustomed to using technology and gadgets will also be more interested in this learning media, which gives a fresh and new

impression in the learning process. Thus, this learning application can be an efficient and innovative choice to increase student interest and learning outcomes (Agustihana & Suparno, 2018). This media is quite effective for offline and online use and flexible regarding time. It can be used anytime because it will be installed on each Android.

The results obtained in this study align with previous research, which also revealed that using the Android application could increase the willingness and concept of learning for students to get better learning outcomes (Aeni et al., 2022). The results of other studies reveal that learning using the Renderforest application is the most effective method for increasing student learning motivation (Wulandari & Putra, 2021). Further research revealed that android-based learning media could improve students' literacy skills (Rahayu et al., 2022). Based on some of the results of these studies, the Android application media is very effective in increasing learning outcomes and student motivation. However, this study has limitations, only looking at the data from the validation test results and the trial phase in a small range, and there is no extensive evaluation stage. Therefore, further research is expected to add more features to science learning media based on Android applications to optimize classroom teaching and learning activities and improve students' mastery of concepts.

#### 4. CONCLUSION

Based on the data analysis and discussion results, it can be concluded that Android-based applications are very suitable for students' learning process, especially in increasing mastery of concepts. In addition, the "BELIPARU" learning application developed for the topic of the fifth-grade elementary school water cycle can fulfill research objectives in increasing student understanding and is considered a valid and effective learning medium with very good qualifications.

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