Appsmart Learning Application Based on PBL Model Assisted by Articulate Storyline 3 on Electrical Energy Material

I Ketut Sukrisnawan[1*], I Gede Margunayasa[2], Gusti Ayu Putu Sukma Trisna[3] (iD)

[1,2,3] Basic Education, Ganesha Education University, Singaraja, Indonesia

A R T I C L E   I N F O

A B S T R A K

Keterampilan pemecahan suatu masalah memiliki peran yang cukup penting bagi siswa, maka sudah seharusnya keterampilan dalam pemecahan suatu masalah tersebut mulai diimplementasikan sejak dini. Siswa merasa bosan di dalam kelas, maka siswa kurang fokus menerima materi yang disampaikan oleh guru. Tujuan penelitian untuk menciptakan aplikasi pembelajaran Appsmart berbasis model PBL berbantuan Articulate Storyline 3. Jenis penelitian ini yaitu Research and Development (R & D). Subjek penelitian ini yaitu 4 orang ahli, 3 orang guru, dan 12 orang siswa. Objek pada penelitian ini yaitu Appsmart berbasis model PBL. Penelitian ini menggunakan desain pre eksperimen, one shot case study. Metode pengumpulan data yang digunakan yaitu kuesioner dan tes. Teknik analisis data yang digunakan yaitu deskriptif kuantitatif dan deskriptif kualitatif. Hasil penilaian dari ahli materi dan ahli media memperoleh skor penilaian sebesar 0,90 dengan kualifikasi validitas yang sangat tinggi. Berdasarkan hasil kepraktisan oleh guru sebesar 92,36%, dan kepraktisan oleh siwa sebesar 90%. Simpulan penelitian dapat diketahui bahwa aplikasi pembelajaran Appsmart berbasis model PBL efektif untuk dapat meningkatkan pemahaman konsep IPA pada materi Energi Listrik. Implikasi penelitian ini mampu meningkatkan kualitas pendidikan sesuai dengan tujuan pembelajaran yang dicapai.

A B S T R A C T

Problem-solving skills are important for students, so these problem-solving skills should be implemented early. Students feel bored in class, so students should be more focused on receiving the material presented by the teacher. The research aims to create an Appsmart learning application based on the PBL model assisted by Articulate Storyline 3. This type of research is Research and Development (R & D). The subjects of this research were 4 experts, 3 teachers, and 12 students. The object of this research is Appsmart based on the PBL model. This research uses a pre-experimental design, a one-shot case study. The data collection methods used were questionnaires and tests. The data analysis techniques used are quantitative descriptive and qualitative descriptive. The material and media experts' assessment results obtained an assessment score of 0.90 with very high validity qualifications. Based on the results, practicality by teachers was 92.36%, and practicality by students was 90%. The research conclusion is that the Appsmart learning application based on the PBL model effectively increases understanding of science concepts in Electrical Energy materials. The implications of this research can improve the quality of education by the learning objectives achieved.

1. INTRODUCTION

Education is a learning process that every human being has to be able to later make that human understand, understand and be more mature and able to make humans able to think critically in learning (Alexander et al., 2020; Moè et al., 2018). There are characteristics in the learning process, namely the presence of teacher elements, student elements, teacher and student activity elements, interaction between teachers and students, aiming at student behavior, and the process and results are planned or programmed (Dewi et al., 2019; Lestari et al., 2022; Ramadhania & Kristiantari, 2020). However, in carrying out learning, there needs to be a curriculum as a guide that can support the learning process. The curriculum as an educational design has an important position in all educational activities, as well as determining the

implementation process and educational outcomes (Giovani, 2020; Triwiyanto, 2022). The implementation of a good curriculum must of course be supported by all teachers in elementary schools. Teachers as role models are expected to be able to create good student character and be able to create a conducive and enjoyable atmosphere for students. One of the things that teachers can apply during the learning process is the use of learning media.

Considering that problem solving skills have an important role for students, these problem-solving skills should start to be implemented from an early age. Even though students are able to remember the material they receive well, the fact is that students do not understand and understand the material presented by the teacher (Muh., 2022; Setyawan, 2020). This is caused by the use of conventional methods and not accustoming students to being active in the learning process activities. This is supported by observations and interviews conducted in elementary schools that teachers are more dominant in using conventional methods during the learning process. The reasons that cause teachers to dominate using conventional methods are limited time when providing learning materials so that teachers distribute learning materials directly to students, lack of learning resources that support the learning process, and lack of information or training related to the use of models, methods., as well as creative and innovative learning media. Continuous use of conventional methods in the learning process makes students sometimes feel bored and some students lose concentration (Hasanah, 2019; A Setyawan, 2020). Apart from that, based on the results of interviews with teachers, it was revealed that, at the end of the lesson, when the teacher asked students to summarize the material that had been taught, students had great difficulty being able to express the material. This is due to students' lack of understanding of the concepts in the material when learning. The results of the 2012 Program for International Student Assessment (PISA) study showed a decline in Indonesia's ranking, from 60th in 2009 to 64th out of 65 participating countries with a score of 383 to 382 (Suryani, 2019). Most of the questions tested require student understanding of concepts, high-level thinking abilities and process skills. Based on the report from the Center for Educational Assessment, Research and Development Agency of the Ministry of Education and Culture in (Sadiqin, 2017) in the PIRLS study, students were in 41st position out of 45 countries, and the results in the 2015 Program for International Student Assessment (PISA) event showed a decline again with Indonesia being ranked 69th out of 76 countries. This shows that students' understanding of concepts in learning materials in Indonesia is still low.

This problem can be overcome by creating a learning media that is able to increase students' interest in learning and understanding. Learning media is one example that can be used by teachers to stimulate thoughts, feelings, abilities, etc. This learning media can encourage the teaching and learning process for students to be more active in learning. Using appropriate learning media in the learning process will have an impact on an effective and efficient learning process (Djannah et al., 2021; Syahroni et al., 2020). Not only learning media, teaching staff also need to pay attention to the learning models used so that students are active in participating in learning. One learning model that students can use to be active in learning is the Problem Based Learning learning model. The principle of Problem Based Learning is that students will be more active in finding answers to their own problems given by the teacher, so that the teacher only acts as a mediator and facilitator in helping build student knowledge (Kaharuddin, 2018; Musyadad., 2019). Using the Problem Based Learning model can improve students' understanding of concepts in the learning process (Aini et al., 2019; Aslan, 2021). What is meant is by developing learning applications that are more attractive both in terms of appearance and delivery of the material in them. One of the advantages of learning applications is that students not only focus on memorizing the material, but students can also imagine using the images in the application.

Previous research findings state that multimedia-based applications are suitable for implementation in grade III elementary schools (Bakhtiar, 2018). Mobile Apps as a learning media based on a contextual approach to facilitate understanding of concepts have met the criteria for product quality, namely valid and practical (Astuti et al., 2017; Futri Basya et al., 2019; Hussain et al., 2021). The learning application developed in this research is called Appsmart. The Appsmart learning application media based on the PBL model assisted by Articulate Storyline 3 which was developed has several advantages that differentiate it from previous learning application media, namely that the material in the Appsmart learning application media is based on the PBL model, so the steps contained in this learning application are in accordance with the steps. steps in the PBL model. The published results of the development of the Appsmart learning application media based on the PBL model are applications that can be run on a laptop. The Appsmart learning application media based on the PBL model is a very practical medium and can be used at any time (Rahmi, 2019; Yolanda et al., 2022). The research study above shows that many learning application developments have been carried out but do not use learning models to support the learning process in these applications. Therefore, this development research has an element of novelty by using the Problem Based Learning model in learning applications. The Problem Based Learning model is adapted to the learning syntax of the application. The aim of this research is to create an Appsmart learning application

based on the PBL model assisted by Articulate Storyline 3 on Electrical Energy material for class V elementary school. It is hoped that the Appmart learning application based on the PBL model assisted by Articulate Storyline 3 developed can improve students' understanding of science concepts in the Electrical Energy material for class V elementary school.

2. METHOD

This research is Research and Development (R & D) research using the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model. The ADDIE design model developed by Molenda and Reiser in 1990 is a learning and training design model that has a generic nature and serves as a guideline in building a training program device or infrastructure that is effective, dynamic, and able to support training performance (Hidayat & Nizar, 2021; Sari & Ulya, 2017). This research was conducted at SD Negeri 4 Bebetin. The subjects of this research were 4 experts (2 media experts and 2 material experts), 3 teachers, and 6 students. The trial design used in this research is a pre-experimental design, one shot case study. The data collection methods used were questionnaires and tests. This research was carried out in several stages, namely the analysis stage, curriculum analysis, needs analysis and student characteristics analysis. In the design stage, research instruments were carried out by experts, media validation by experts, and user responses (teachers and students) were collected. The implementation stage was carried out by applying the Appsmart learning application based on the PBL model to class V students at SD Negeri 4 Bebetin and the evaluation stage carried out formative and summative evaluations. The data collection instruments in this research are material expert questionnaires, media expert questionnaires, teacher/practitioner response questionnaires, student questionnaires, and multiple-choice questions which are used to determine the effectiveness of using the Appsmart learning application based on the PBL model. The instrument grid used in this research can be seen in Table 1, Table 2, Table 3, Table 4 and Table 5.

Table 1. Material Expert Instrument Grid

No	Aspect		Indicator	Instrument Number	Number of Items
1.	Quality of Material Content	a.	Suitability of Electrical Energy material to learning objectives.	1	1
		b.	Coverage of Electrical Energy material in Learning Applications (Appsmart) is brief, concise and clear.	2	1
		c.	Electrical Energy Material in Learning Applications (Appsmart) is easy to understand.	3	1
		d.	Suitability of images in the Learning Application (Appsmart) with Electrical Energy material.	4	1
		e.	Suitability of animations in Learning Applications (Appsmart) with Electrical Energy material.	5	1
		f.	Suitability of video with Electrical Energy material in Learning Applications (Appsmart).	6	1
		g.	Helps in improving understanding of Electrical Energy material.	7	1
2.	Language Quality	a.	The correct use of language in the Learning Application (Appsmart) is in accordance with EYD rules.	8	1
		b.	Clarity in the use of word meanings in Learning Applications (Appsmart).	9	1
3.	Question/Test Quality	a.	Suitability of the type of exercise/test with the learning objectives in the Electrical Energy material.	10	1
		Amount			**10**

Table 2. Media Expert Instrument Grid

No	Aspect		Indicator	Instrument Number	Number of Items
1.	Text	a.	Appropriate text type and size	1	1
		b.	Clarity of text on each point of discussion	2	1
		c.	Match the text color with the Appsmart media background	3	1
2.	Picture	a.	Image clarity on Appsmart media	4	1
		b.	The attractiveness of images on Appsmart media	5	1
		c.	Accuracy of images in supporting material explanations	6	1
		d.	Suitability of image placement on Appsmart media	7	1
3.	Animation	a.	Quality of animation on Appsmart media	8	1
		b.	Suitability of animations used in Appsmart media	9	1
4.	Videos	a.	Video quality on Appsmart media	10	1
		b.	Clarity of sound on video	11	1
		c.	Suitability of videos with learning materials on Appsmart media	12	1
		d.	Videos support and make it easier to understand the material presented	13	1
		e.	The attractiveness of the videos used in Appsmart media	14	1
5.	Audio	a.	Quality sound effects on the buttons	15	1
6.	Layouts Application	a.	Compatibility of the layout of the writing in the application	16	1
		b.	Conformity of image proportions to the text in the application	17	1
		c.	Clarity of title display in each subject	18	1
7.	Program Operation	a.	Ease of use of Appsmart	19	1
		b.	Appsmart can be used repeatedly	20	1
	Amount				**20**

Table 3. Practitioner Response Instrument Grid

No	Aspect		Indicator	Instrument Number	Number of Items
1	Appearance	a.	Overall, Appsmart's media appearance is attractive.	1	1
		b.	Writing in Appsmart media can be read clearly.	2	1
		c.	The image in the Appsmart media is clearly visible.	3	1
		d.	Harmonization of sound with background sound in learning material videos.	4	1
		e.	The Appsmart media color display is attractive.	5	1
2	Material	a.	The material contained in Appsmart media can be easily explained to students so that they can understand it.	6	1
		b.	The presentation of the questions given on the Appsmart media is in accordance with the Electrical Energy material.	7	1
		c.	Appsmart media already has problems that suit the surrounding environment.	8	1
3	Operation	a.	Appsmart media can be easily used for teaching.	9	1
		b.	Appsmart media can be used repeatedly to help learning effectiveness.	10	1
	Amount				**10**

Table 4. Student Response Instrument Grid

No	Aspect	Indicator	Instrument Number	Number of Items
1	Appearance	a. The Appsmart media display is interesting to me.	1	1
		b. I can clearly read the writing on Appsmart media.	2	1
		c. I can clearly see the image on the Appsmart media.	3	1
		d. I can clearly hear the voice in the video explanation of the material on Media Appsmart.	4	1
		e. The color display on Appsmart media is very interesting to me.	5	1
2	Operation	a. I can quickly open Appsmart media.	6	1
		b. Appsmart very easy to run on a laptop or PC.	7	1
3	Understanding Problem Based Learning Concepts and Models	a. Through Appsmart media, I have become more aware of the concept of electrical energy.	8	1
		b. Using Appsmart media makes me responsive in solving problems in Electrical Energy Material	9	1
5	Expediency	a. I can easily find out about Electrical Energy material through Appsmart media.	10	1
	Amount			**10**

Table 5. Multiple Choice Question Instrument Grid

No	Material	Learning objectives	Question Indicator	Cognitive Level	Question Form	No. Question
1	Electrical energy	1. Students describe what electrical energy is and the use of electricity in everyday life.	Students analyze the application of electrical energy in the surrounding environment.	C4	P.G	1, 2
		2. Students demonstrate how electricity is produced and distributed.	Students identify components in an electrical circuit.	C3	P.G	3, 4, 5
			Students show examples of series electrical circuits.	C2	P.G	6
		3. Students find out the various types of power plants.	Students show examples of parallel electrical circuits.	C2	P.G	7
			Students determine the advantages of series circuits and parallel circuits.	C3	P.G	8, 9, 10
			Students compare the weaknesses of series circuits and parallel circuits.	C4	P.G	11, 12
			Students classify changes in electrical energy	C2	P.G	13, 14, 15

No	Material	Learning objectives	Question Indicator	Cognitive Level	Question Form	No. Question
			in the surrounding environment. Students choose examples of power plants in the surrounding environment.	C4	P.G	16,17,18
			Students interpret the sentence in an effort to save electrical energy correctly.	C5	P.G	19
			Students analyze a problem regarding series circuits and parallel circuits in the surrounding environment.	C4	P.G	20

The questionnaire was created using a rating scale with 5 response categories, namely very good with a score of 5, good with a score of 4, fair with a score of 3, poor with a score of 2, and very poor with a score of 1. Before it can be used to collect research data, the instrument is tested for suitability /validity first. Analysis of the content validity of the instrument was tested using the Gregory formula. The validity of dichotomous instrument items was tested for suitability using the point biserial correlation technique (). The reliability of multiple-choice instruments uses the Kunder Richardson 20 (KR-20) formula. Apart from that, different power tests and difficulty levels were carried out for multiple choice questions. The questionnaire instrument was only tested for content validity, while the objective question instrument was tested for content validity, item validity, reliability, distinguishability and level of difficulty. After the instrument is suitable for use for data collection, the data that has been obtained is analyzed descriptively qualitatively and descriptively quantitatively. The qualitative descriptive analysis method is a method or processing of data by systematically arranging and forming sentences or words. This qualitative research was obtained from suggestions and input on learning applications from experts, including material experts, media experts, teacher responses and student responses. Quantitative descriptive analysis is used to describe the average scores of expert teachers and students. Decision making on the results of the questionnaire was analyzed using the accuracy of the four-scale achievement level conversion, while the objective question result data was analyzed using the correlated t-test. γ_{pbi}

3. RESULT AND DISCUSSION

Results

This development research is an Appsmart learning application based on the PBL model assisted by Articulate Storyline 3 on Electrical Energy material for class V elementary school. The results of the curriculum analysis are used as a basis for developing the Appssmart learning application, the Flow of Learning Objectives (ATP), Learning Achievements (CP), and Criteria for Completion of Learning Objectives (KKTP) can be seen in Table 6.

Table 6. Summary of ATP

Flow of Learning Objectives	Learning Outcomes	Learning objectives	Material
Phase C	Based on their understanding of electrical energy and its use, students demonstrate how electricity is produced and distributed, and find out	1. Students describe electrical energy and the use of electricity in everyday life. 2. Students demonstrate how electricity is	Definition of electrical energy, electrical energy circuits, and examples of electrical energy generation.

Flow of Learning Objectives	Learning Outcomes	Learning objectives	Material
	about types of electricity generation.	produced and distributed. 3. Students find out the types of power plants.	

The results of the needs analysis are that in science learning the learning resources in the form of teaching modules are not optimal in supporting learning. The learning models used by teachers in the learning process are varied but not optimal and only use conventional methods, so that science learning seems boring for students. The results of the analysis of student characteristics were carried out using questionnaires and the results showed that 67% of students had difficulty understanding science learning material, 75% of students were interested in problem solving, and 100% of students were interested in developing the Appsmart learning application based on the PBL model. The second stage is the design stage. The planning or design stage in this research begins with designing the design of the Appsmart learning application. Next, the Appsmart learning application design that has been created is given to the supervisor to provide input and suggestions. The Appsmart learning application was created based on input and suggestions and created an instrument for media experts and media practicality. The Appsmart learning application consists of 3 displays, namely, initial display, home display and final display. The Appsmart learning design and application that has been created is presented in Figure 1.
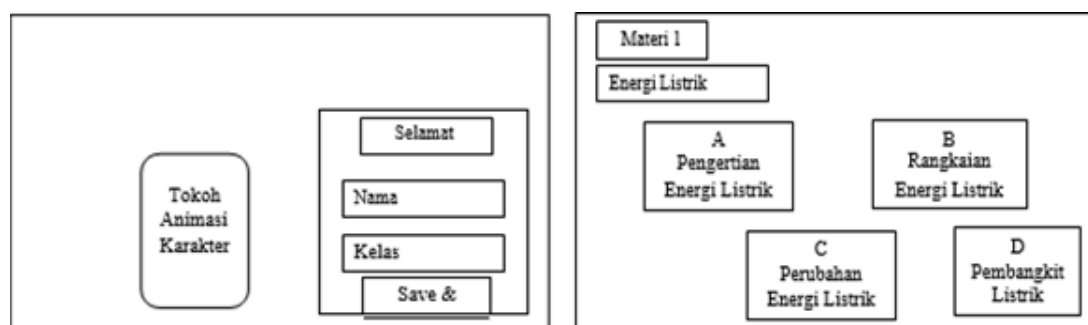

Figure 1. Appsmart Learning Design and Application

The third stage is development. In the development stage, testing activities are carried out by media experts, material experts and practitioners to review and determine the feasibility of the application being developed. Analysis was carried out by conducting a validity test. Furthermore, improvements can be made based on suggestions and input provided by experts. Media that is valid from an expert's point of view, is tried out on practitioners and students to find out about the media that has been developed. Based on the assessment results from material experts and media experts, they obtained an assessment score of 0.90 with very high validity qualifications. Based on the results, practicality by teachers was 92.36%, and practicality by students was 90%. Based on effectiveness, the Appsmart learning application based on the PBL model assisted by Articulate Storyline 3 is effective in increasing understanding of science concepts in Electrical Energy material for class V elementary school. The results of the Appsmart learning application based on the PBL model assisted by Articulate Storyline 3 are presented in Figure 2.
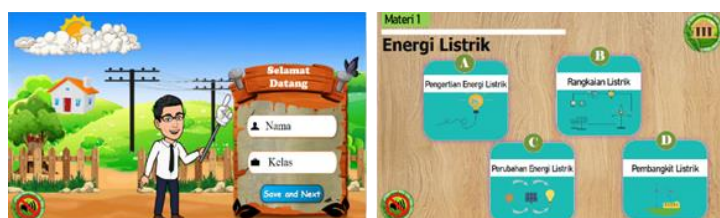

Figure 2. Appsmart Learning Application Based on the PBL Model Assisted by Articulate Storyline 3

Discussion

This research was carried out through five stages in accordance with the ADDIE development model, namely analysis, design, development, implementation and evaluation (Aminah, 2018; Hidayat, 2021). The ADDIE model can also allow each stage of development to refer to the previous steps, so that the

resulting product is a product that has quality and is effective (Alfah, 2020; Ichsan et al., 2018). There are several reasons why the Appsmart learning application based on the PBL model has received a very good assessment by experts and practitioners, and is effective for use in the learning process to increase understanding of science concepts in Electrical Energy material. First, this development research produces a learning application based on the PBL model in Electrical Energy material for class V elementary school. The Appsmart learning application based on the PBL model has its own characteristics compared to other learning applications, because the Appsmart learning application based on the PBL model is specifically focused on Electrical Energy material. In addition, the Appsmart learning application will be adapted to the PBL model syntax. In line with this statement, it is stated that through the PBL model, students can be trained to work independently and in groups to solve a problem. Problem Based Learning is a learning model that exposes students to real world problems to start learning and can provide active learning conditions for students (Hotimah, 2020; Shofiyah, 2018). Learning using the Problem Based Learning learning model is able to explore students' potential in using critical thinking skills (Safrida, 2020; Utami, 2020).

Second, in developing learning applications Appsmart based on the PBL model, there are learning videos and problem solving videos. The use of animated videos is a combination of video, audio, text and animation media which aims to stimulate the five senses and motivate students, so that learning is more interesting and creative (Novita, 2019). Apart from that, teachers are also believed to be able to explain and illustrate important concepts in the learning videos given to students. The use of learning videos for students' understanding of science concepts was stated to be very influential and students experienced an increase in their understanding of science concepts in animal life cycle material (Nurdiana et al., 2021). The use of learning videos really helps students to understand the material taught by the teacher. Third, the learning process with the Appsmart learning application based on the PBL model on Electrical Energy material is in line with Ausubel's learning theory. Ausubel's learning theory is a theory that states that it helps students instill new knowledge from material and places emphasis on meaningful learning (Sujana, 2022; Wulandari, 2021). Students not only emphasize the material, but students can also connect the concepts in the material with real life in the environment around them. Understanding concepts in learning is very useful for students in the future when encountering similar problems in everyday life. With this, students will be able to understand the material being taught and be able to master the understanding of concepts in Electrical Energy material.

Use of learning applications Appsmart based on the PBL model in the learning process is also in line with constructivism theory. Constructivism theory is a process of knowledge carried out by students themselves, so that students can be active in carrying out activities, formulating concepts, and giving meaning to something they have learned (Abdiyah, 2021; Riyanti, 2021). This is said to be appropriate because when using the Appsmart learning application based on the PBL model, students can directly use or operate it. Apart from that, the Appsmart learning application based on the PBL model also directs students to be able to think critically and solve problems that exist in the Appsmart learning application. Learning activities that directly involve students can provide learning experiences, so that students have a good understanding of the material. The form of media in the form of applications makes it easy to access anywhere and anytime. Apart from that, the visualization in this learning application is more interesting and creative which can increase students' motivation in learning. Not only does it contain material, this application also contains games and evaluations which are useful for students to understand well the material they have studied. This can increase understanding of science concepts in Electrical Energy material.

This finding is strengthened by previous research findings stating that multimedia-based applications are suitable for implementation in grade III elementary schools (Bakhtiar, 2018). Mobile Apps as a learning media based on a contextual approach to facilitate understanding of concepts have met the criteria for product quality, namely valid and practical (Futri Basya, 2019). The obstacle in this research is that creating media requires quite a long time because of the application Articulate Storyline 3 quite complex and sometimes not supported on certain laptops. The implementation of trials in product assessment was hampered due to semester holidays for elementary school students, so the product trial time was delayed several weeks. The Appsmart learning application based on the PBL model is also sometimes slow in running certain features. This can be overcome by temporarily exiting the application and pressing the refresh button on the desktop. The material developed in the Appsmart learning application based on the PBL model is only limited to the odd semester class V science learning content, Chapter 3, Topic B. How to Get Electrical Energy. The implications of this research are that teachers can design learning devices that are suitable for use in the Appssmart learning application.

4. CONCLUSION

The Appsmart learning application based on the PBL model assisted by Articulate Storyline 3 received excellent qualifications from experts, teachers and students. It was concluded that the Appsmart learning application based on the PBL model assisted by Articulate Storyline 3 was suitable for use. The Appsmart learning application based on the PBL model assisted by Articulate Storyline 3 can improve students' understanding of science concepts in Electrical Energy material for class V elementary school. Schools need to prepare supporting facilities for the Appssmart learning application so that the application can run smoothly when used.

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