



The Appsmart Learning Application Based on the PBL Model Assisted by Articulate Storyline 3 Material on Earth and The Universe

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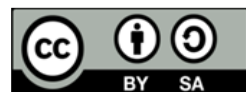
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ABSTRAK

Penurunan hasil belajar IPA siswa disebabkan karena kurangnya penerapan model pembelajaran yang sesuai dengan kebutuhan siswa. Adapun tujuan dari penelitian ini yakni untuk mengembangkan aplikasi pembelajaran *Appsmart* berbasis model PBL berbantuan *Articulate Storyline 3* yang membahas materi Bumi dan Alam Semesta kelas V SD. Penelitian ini tergolong kedalam jenis penelitian pengembangan, yang dikembangkan dengan menggunakan model ADDIE. Model pengembangan ADDIE terdiri dari lima tahapan yakni tahap analisis, desain, pengembangan, pengimplementasian, dan evaluasi. Adapun subjek yang terlibat dalam penelitian ini yakni 4 ahli, 3 guru dan 28 siswa. Pengumpulan data dalam penelitian ini dilakukan menggunakan metode tes dan kuesioner, dengan instrument penelitian berupa tes evaluasi, serta kuesioner uji ahli. Data yang diperoleh dalam penelitian kemudian dianalisis dengan menggunakan teknik analisis deskriptif dan menggunakan rumus *mean* untuk mengetahui tingkat kelayakan dan tingkat kepraktisan. Hasil uji kelayakan aplikasi mencapai 4,67 dan hasil uji kelayakan materi mencapai 4,65 sehingga dapat dinyatakan layak untuk digunakan. Hasil uji kepraktisan guru dan siswa mencapai 4,87 dan 4,97 yang dinyatakan praktis untuk diterapkan. Nilai signifikansi uji-t menunjukkan angka 0,00. Berdasarkan hasil tersebut maka dapat diketahui bahwa terdapat pengaruh signifikan dari aplikasi pembelajaran *Appsmart* berbasis model PBL berbantuan *Articulate Storyline 3* dengan pemahaman konsep IPA materi Bumi dan Alam Semesta siswa kelas V.

ABSTRACT

The decline in students' science learning outcomes was due to the need for more application of learning models that fit students' needs. This study aims to develop an Appsmart learning application based on the PBL model assisted by Articulate Storyline 3, which discusses Earth and the Universe material for fifth-grade elementary school. This research belongs to the type of development research which was developed using the ADDIE model. The ADDIE development model comprises five stages: analysis, design, development, implementation, and evaluation. The subjects involved in this study were four experts, three teachers, and 28 students. Data collection in this study was carried out using test and questionnaire methods, with research instruments in the form of evaluation tests and expert test questionnaires. The data obtained in the study were then analyzed using descriptive analysis techniques and the mean formula to determine the level of feasibility and practicality. The results of the application feasibility test reached 4.67, and the material feasibility test reached 4.65 so that it could be declared fit for use. The results of the practicality test for teachers and students reached 4.87 and 4.97, which were stated to be practical to implement. The significance value of the t-test shows the number 0.00. Based on these results, there is a significant influence from the PBL model-assisted Appsmart learning application assisted by Articulate Storyline 3 with an understanding of the science concept of Earth and the Universe material for fifth-grade students.

1. INTRODUCTION

The development of education levels is the most important highlight that is very much considered to date by the government or society. Education is a conscious effort to realize cultural inheritance from one generation to another (Rahman et al., 2022; Sujana, 2019). In Indonesia, the implementation of formal

education starts from the basic education level, where basic education is the level of education that is carried out before entering secondary education and is carried out at the elementary school level for six years and junior high school (Aryanto et al., 2021; Nadziroh et al., 2018). Basic education is carried out through a process that does not only provide basic intellectual abilities such as reading, writing, and arithmetic but also the process of developing abilities optimally in intellectual, social, and personal aspects (Komara, 2018; Muskania & Zulela, 2021). The curriculum is one of the components and guidelines that can facilitate the implementation of education to achieve its goals (Fajri, 2019). Elementary Schools (SD) implement the Independent Curriculum, which is a new policy program of the Ministry of Education and Culture of the Republic of Indonesia (Kemendikbud RI) launched by the Minister of Education and Culture of the Republic of Indonesia Indonesian Cabinet (Hakiky et al., 2023; Indarta et al., 2022; Jannati et al., 2023). One learning content taught in the independent curriculum is the natural science content of the Earth and the Universe. Earth and the Universe learning material studies the formation of the Earth and the Universe and examines everything in it (Khasna & Muh, 2020; Pakpahan et al., 2022). This learning material aims to introduce students to the Earth where they live and teach them always to take care of the Earth and its contents.

The reality shows that student learning outcomes in this material are still relatively low. Based on the data obtained at SD Negeri 4 Tamblang regarding student learning outcomes, especially in understanding students' concepts, 22 students experienced a decrease when viewed from the average summative midpoint in the previous semester, which was 79.63 compared to the average score of these students seen in the average value of 66.09. When compared to the average value obtained with the Learning Objective Completeness Criteria using the value interval, the average value belongs to the 66-85% interval, which means that the criteria have reached completeness but are not optimal. Furthermore, the observations also show that teachers always try to use media in the learning process with students. However, the learning media used has remained the same. The fifth-grade teacher applies learning media using blackboards, textbooks, LCD projectors, laptops, and Chromebooks. Due to limitations, learning media at SDN 4 Tamblang in the form of technology still needs to improve in application. The limitations are in the form of facilities and infrastructure, skills, the influence of the community environment, and the limitations of teachers in being creative and innovative in carrying out the learning process. If left unchecked continuously, these problems will certainly impact decreasing student learning outcomes and not achieving learning goals properly.

One of the efforts that can be made to overcome these problems is by using interesting learning and application media. An application is a ready-to-use program designed to perform a function for the user or other applications (Azis et al., 2020; Wulandari et al., 2021). Applications can also be interpreted as program commands that can later be designed to achieve certain goals (Afrizal, 2017; Sutejo & Yogi, 2021). The Articulate Storyline 3 application can create a more attractive appearance or learning media (Rati, 2022; Salwani & Ariani, 2021). Another advantage of Articulate Storyline 3 is the ease of triggering functions or button navigation without complicated coding (Pratiwi et al., 2023; Rianto, 2020). On Appsmart, learning videos invite students to find a problem in everyday life, learning materials supported by pictures and interesting features, and student evaluation tests (Junpahira & Pahlevi, 2023). Learning media in the form of appsmart will be more effectively used if accompanied by the application of problem-based learning (PBL) learning models or problem-based learning. Problem-based learning is a learning model that has the characteristics of discussing real problems so that it requires students to learn to think critically, and problem-solving skills, and gain knowledge (Anjelina, Putri, 2018; Elfina & Sylvia, 2020; Yuniar & Hadi, 2023). Applying the PBL model is carried out by linking concrete problems as a learning context so that students can learn about critical thinking and problem-solving skills and acquire essential knowledge and concepts from the subject matter (Kenedi, 2019; Safithri et al., 2021).

Several previous studies have revealed that social studies learning applications are very feasible to use in the learning process (Permana & Sujana, 2021). Other studies revealed that android-based biology learning media on excretory system material for grade eight junior high schools was declared valid and feasible to use in the learning process (Elci et al., 2021). Further research revealed that problem-based learning (PBL) interactive learning multimedia using the articulate storyline application on chemical bonding material was declared feasible and could be used as a medium and learning resource for students (Rati et al., 2022). Based on some of the results of these studies, learning applications can positively influence student learning processes. In previous research, no studies specifically discussed the development of app smart learning applications based on the PBL model assisted by articulate storyline three material on Earth and the Universe. So, this research is focused on this study to describe the design and know the feasibility, practicality, and effectiveness of the Appsmart learning application based on the PBL model assisted by Articulate Storyline 3 on the material Earth and the Universe in fifth-grade elementary school.

2. METHOD

This research belongs to the type of development research which was developed using the ADDIE model. The ADDIE development model comprises five research stages: analysis, design, development, implementation, and evaluation. The analysis phase is a development research activity consisting of curriculum, needs, and characteristic analysis. Curriculum analysis is carried out through the activities of studying ATP (learning objectives flow), CP (learning achievements), TP (learning objectives), and KKTP (criteria for completeness of learning objectives). The results of observations at SD Negeri 4 Tamblang became one of the driving schools implementing the Independent Curriculum. At the same time, a needs analysis was carried out to determine what matters the teacher needs to encourage the learning process to develop and achieve better learning goals. Then, the analysis of student characteristics aims to determine the level of student abilities that vary from one student to another based on developmental knowledge and skills.

After completing the analysis activities, proceed with the design stage. This stage begins with preparing material to be developed in the PBL-based Appsmart learning application assisted by Articulate Storyline 3 and continues to design according to competence. The steps in the product planning stage are selecting and determining the software to be used, namely Articulate Storyline 3. Second, compiling a design related to the application to be developed. Third, the design results will be carried out with guidance to the supervising lecturer to get suggestions and input, which will later be used as evaluation material, followed by improvements. After the supervisor approves the sketch, it is continued to make the media. In addition, at this stage, the preparation of instruments related to the feasibility of the media, student, and teacher response instruments and the preparation of the developed media effectiveness instruments.

The development stage is an activity to realize a product plan developed and given input by the supervisor. The PBL-based Appsmart learning application developed includes an opening, initial, and home display. The implementation stage is applying the results in the field to know the effect on learning. The evaluation phase is an activity that includes formative evaluation and summative evaluation activities. Formative evaluation is a process of data collection activities carried out at each stage of media development. Summative evaluation is a data collection activity that occurs at the end of an activity program that aims to determine the effectiveness of the media being developed.

The population for the product trial was carried out at one of the driving schools in Kubutambahan District, namely SD Negeri 4 Tamblang, using a purposive sampling technique, which is a sampling technique with certain considerations. This development research took a sample of fifth-grade students at SD Negeri 4 Tamblang, which would be used as the test subject. The trials conducted in this study were only in one class using a pre-experimental design, a one-shot case study. At the implementation stage, product trials using the pre-experimental one-shoot case study design involve only one group (X) in a particular treatment, followed by measurement or treatment (O). The types of data used in this development research are qualitative and quantitative data. Quantitative data can be obtained from expert feasibility rating scales, teacher response rating scales, student response rating scales, and effectiveness test data. The qualitative data were obtained from curriculum analysis, needs analysis, analysis of student characteristics, as well as obtaining input and suggestions from experts.

The method used in this study is the test method and questionnaires. The test method determines students' knowledge, skills, intelligence, and abilities by using a question as an objective test. The test is also used to determine the effectiveness of using the PBL-based Appsmart learning application at SD Negeri 4 Tamblang. The mechanism of this method is to give an evaluation test to students with as many as 15 items to determine the level of understanding of the science concept of Earth and the Universe material for grade five at SD Negeri 4 Tamblang. The questionnaire is a data collection activity that provides a set list of questions or written statements for the respondents or research subjects to answer. The questionnaire is a data collection instrument that is classified as efficient if the researcher knows about the instrument being measured and knows what can be expected from the answers by the respondents. This Appsmart development research uses rating scale instruments and multiple-choice tests. To account for the level of validity in an instrument, the steps involved are making an instrument grid table, carrying out guidance related to the instrument grid with the supervisor, and compiling instruments that refer to the instrument grid. The research instrument grids can be seen in [Table 1](#), [Table 2](#), [Table 3](#), [Table 4](#), and [Table 5](#).

Table 1. Media Expert Appsmart Instrument

No.	Aspect	Indicator	Instrument Number	Number of Items
1.	Text	Appropriate text type and size	1	1
		Text clarity	2	1
		Color match	3	1

No.	Aspect	Indicator	Instrument Number	Number of Items
2.	Image	Image clarity	4	1
		Image attractiveness	5	1
		Support material	6	1
		Compatibility of image placement	7	1
3.	Animation	Animation quality	8	1
		Appropriateness of the animation used	9	1
4.	Videos	Sound clarity	10	1
		Compatibility of the video with the material	11	1
		Videos make it easier for students to understand the material	12	1
		The attractiveness of the video used.	13	1
5.	Audio	Quality sound effects on the buttons.	14	1
6.	Layouts	Layout compatibility	15	1
		Appropriateness of the proportions of the image and the text	16	1
		Title display clarity	17	1
7.	Program Operation	Ease of use of Appsmart	18	1
		Ease of navigation function keys	19	1
		It can be used repeatedly	20	1
Total				20

Table 2. Appsmart Instrument for Subject Content Experts

No.	Aspect	Indicator	Instrument Number	Number of Items
1	Content Quality Material	Suitability of material to learning objectives	1	1
		The content of the material is short, concise, and clear	2	1
		The material is easy to understand	3	1
		Suitability of image to material.	4	1
		Suitability of animation to material	5	1
		Suitability of video to material.	6	1
		It helps in improving understanding of the material	7	1
2	Language Quality	Accuracy of language use	8	1
		Clarity of word meaning	9	1
3	Quality of practice questions/tests	Appropriateness of the type of exercise/test with the learning objectives	10	1
Total				10

Table 3. Media Practicality Sheet by the Teacher

No.	Aspect	Indicator	Instrument Number	Number of Items
1	Appearance	Appsmart displays attractiveness	1	1
		Writing can be read clearly	2	1
		Images are visible	3	1
		The narration sounds clear	4	1
		Combination use of colors	5	1
2	Material	The material is easy to understand	6	1
		The presentation of the questions given is by the material	7	1
		There are problems according to the surrounding environment	8	1

No.	Aspect	Indicator	Instrument Number	Number of Items
3	Operation	Ease of using Appsmart	9	1
		Appsmart can be used repeatedly	10	1
Total				10

Table 4. Media Practicality Sheet by Students

No.	Component	Indicator	Number of Items
1.	Material Aspects	The clarity of the material presented	3
		The suitability of the language used in delivering the material	
2.	Appsmart Quality Aspects	Material convenience	5
		Clarity of study instructions	
3.	Usefulness Aspects	Appsmart displays attractiveness	2
		The attractiveness of colors in Appsmart	
		The attractiveness of images in Appsmart	
		Ease of use of Appsmart	
The usefulness of Appsmart is to help students understand material/topics			2
The attractiveness of Appsmart for interest in learning			
Total			10

Table 5. Instruments for Understanding the Concept

Material	Goals	Question indicator	Cognitive level	Question form	Question number
Earth and the Universe	1.Students can understand the natural appearance of our Earth.	Students conclude the meaning of Earth	C1	PG	1
		Students interpret the shape and surface area of the Earth	C5	PG	2, 3
		Students explain the meaning of the three parts of the Earth	C2	PG	4,5,6
		Students give examples of parts of the hydrosphere on earth	C2	PG	7
		Students master and give examples of the lithosphere	C2	PG	8, 9
		Students explain the parts of the Earth's atmosphere	C2	PG	10,11,12
		Students compare changes in the condition of the Earth's surface since then and now	C4	PG	13
		Students explain the negative Impact of natural factors changing the Earth	C2	PG	14
		Students classify the structure of the layers of the Earth's atmosphere	C2	PG	15, 16
		Students explain and give examples of natural factors that influence changes in the Earth	C2	PG	17, 18
		Students conclude the meaning of the water cycle.	C5	PG	19
		Students summarize the process of the water cycle	C6	PG	20

Testing the instrument's validity is a requirement of the feasibility and quality of an instrument intended to determine the eligibility rate and to measure the target of the measurement. A good instrument must meet the validity requirements. The validity test is filled by several experts (judges) in their field.

Validity analysis uses the Gregory formula, which develops content testing techniques that have been quantified. According to Gregory, the mechanism for calculating content validity testing is experts trusted to provide item-by-point instrument assessments appropriate and inappropriate scale groupings, and the results of the experts' assessments are cross-tabulated. In determining the coefficient of content validity, the results of research from several experts (judges) are converted into 2x2 cross-tabulations in columns A, B, C, or D. After the results of content validity have been known using the Gregory formula, the value of the content validity of the instrument is obtained compiled, which is then converted into [table 6](#).

Table 6. Content Validity Coefficient Criteria

coefficient	validity
0.80 – 1.00	Very high
0.60 – 0.79	High
0.40 – 0.59	Medium
0.20 – 0.39	Low
0.00 – 0.19	Very low

Next, to calculate the reliability of the multiple choice instrument, the Kunder Richardson 20 (KR-20) formula is used with the test reliability criteria in [Table 7](#).

Table 7. Test Reliability Criteria

Reliability Coefficient Limitations (r)	Criteria
0.00 < r ≤ 0.20	Very low
0.20 < r ≤ 0.40	Low
0.40 < r ≤ 0.60	Medium
0.60 < r ≤ 0.80	High
0.80 < r ≤ 1.00	Very high

The analysis then continued with the item validity analysis technique used to calculate the item validity of the instrument, which is a correlation coefficient using the point biserial correlation technique (γ_{pbi}). It is followed by measuring the difficulty level of the questions with the test instrument used to test the effectiveness of Appsmart, which has been declared valid. The criteria for determining the difficulty level of this instrument are carried out by calculating the average difficulty level of each item and adjusting it to the criteria, as shown in [Table 8](#).

Table 8. Difficulty Level of the Test

Difficulty level	Category
0.00 – 0.30	Hard
0.31 – 0.70	Medium
0.71 – 1.00	Easy

The analysis then continued with the differential power test, which was carried out to ensure that the instruments used could distinguish students with high abilities from those with low abilities. Differential power testing is carried out with the test instrument used to test the effectiveness of the PBL-based Appsmart learning application. The criteria for determining discriminating power are carried out by calculating the average discriminating power of each item and adjusting it to the criteria, as shown in [Table 9](#).

Table 9. Differentiating

Different	Category
Negative (< 0.00)	Bad
0.00 – 0.19	Less
0.20 – 0.39	Enough
0.40 – 0.70	Good
0.71 – 1.00	Very good

Media feasibility analysis uses the average or mean formula. The average score obtained is then converted using the five-scale conversion guidelines in [Table 10](#).

Table 10. The Scale of five Feasibility and Practicality Ratings of the Media

Score Range	Predicate classification
$3.75 \leq X < 5.01$	Very good
$2.92 \leq X < 3.75$	Good
$2.08 \leq X < 2.92$	Enough
$1.25 \leq X < 2.08$	Not good
$-0.01 \leq X < 1.25$	Bad

Analysis of the effectiveness of the media on the concept of understanding science was carried out using the one-sample t-test formula. Before that, a prerequisite test, namely the normality test, must be carried out. The formulation of the hypothesis tested in the one-sample t-test is H_0 : Appsmart learning applications based on the PBL model assisted by Articulate Storyline 3 are ineffective for increasing understanding of natural science concepts in Earth and the Universe material. H_a : The Appsmart learning application based on the PBL model assisted by Articulate Storyline 3 effectively increases understanding of natural science concepts on Earth and the Universe. The value of understanding elementary science concepts on Earth and the Universe material before implementing the media will be compared with the value of the Learning Objectives Completeness Criteria. Effectiveness data analysis was carried out using the SPSS version 25 application. The provisions for analyzing data were one sample t-test on SPSS if the Sig. (2-tailed) If the value of Sig is < 0.05 , then H_0 is rejected. $(2\text{-tailed}) > 0.05$, then H_0 is accepted, and H_a is rejected.

3. RESULT AND DISCUSSION

Result

The design of the Appsmart learning application based on the PBL model is based on the results of the analysis that has been carried out before. The Appsmart learning application based on the PBL model has a size of 1280 x 720 pixels, which consists of an opening display, while the initial display and home display of learning media can be seen in [Figure 1](#), [Figure 2](#), and [Figure 3](#).



Figure 1.
Appsmart Opening View



Figure 2.
Appsmart Home Screen



Figure 3.
Home View

Further research on media development shows several findings in this study, including the first finding related to the feasibility of PBL-based appsmart learning applications. The feasibility value of the application was obtained from the assessment of the four experts, where the results of the study were then analyzed using the average formula to obtain the feasibility index and eligibility qualifications for the PBL model-based Appsmart learning application. Briefly, the results of the media feasibility analysis can be seen in [Table 11](#).

Table 11. Analysis of Average Suitability of Material and Media

Expert	Items	Evaluator		Σx	n	M	Description
		I	II				
Media	1-20	94	93	187	20	4.67	Very Good
Material	1-10	46	47	93	10	4.65	Very Good

developed is included in very good feasibility. Appsmart learning applications based on the PBL model obtain very good eligibility qualifications. The second finding relates to the practicality of PBL-based app smart learning applications. The practicality test activity by the teacher involved three people and 6 students. The results of practicality assessments by teachers and students can be seen in [Table 12](#), and [Table 13](#).

Table 12. The Results of the Teacher's Practicality Assessment

Result	First practitioner	Second practitioner	Third practitioner
Average Score (x)	4.8	4.9	4.9
Overall Score Average	4.87		

Table 13. Results of Students' Practicality Assessment

Result	Score					
	First Student	Second Student	Third Student	Fourth Student	Fifth Student	Sixth Student
Average Score (x)	5	5	4.9	5	4.9	5
Overall Score Average	4.97					

Based on the five-scale conversion, the teacher rated the practicality level as very good, and based on the five-scale conversion, students assessed the PBL model-based Appsmart learning application with a very good practicality level. The third finding relates to the results of the media effectiveness test. The implementation phase tested the effectiveness of the PBL model-based Appsmart learning application on the ability to understand science concepts in fifth-grade elementary school Earth and the Universe material. The Appsmart learning application based on the PBL model was implemented at SD Negeri 4 Tamblang. The evaluation results show that the Appsmart learning application is based on the PBL model, developed to improve understanding of natural science concepts in Earth and the Universe material. The media effectiveness test was carried out through a one-shot case study design using the one-sample t-test technique. The subjects used were fifth-grade students at SD Negeri 4 Tamblang.

Meanwhile, the object used in the effectiveness test is the ability to understand scientific concepts in the Earth and the Universe material. The value of the ability to understand the concept of science on Earth and the Universe is obtained when implementing the PBL model-based Appsmart learning application compared to the value of the Learning Objectives Mastery Criteria. Before the one-sample t-test is carried out, it is necessary to have a prerequisite test, namely the normality test of data distribution. The results of the prerequisite analysis are described as follows.

Based on the normality test results, the Kolmogorof-Smirnov column's significance value was 0.20, and the significance value for the Shapiro-Wilk column was 0.83. These results indicate that the significance value in both columns is greater than 0.05 (5% significance level). The value of understanding the concept of science in Earth and the Universe material after implementing the Appsmart learning application based on the PBL model is normally distributed, as presented in Table 14.

Table 14. Normality Test Results

Kolmogorov-Smirnov			Shapiro-Wilk		
Statistic	df	Sig.	Statistic	df	Sig.
0.138	22	0.200	0.922	0.22	0.83

The one-sample t-test aims to determine whether there are differences in students' comprehension abilities before and after implementing the Appsmart learning application based on the PBL model assisted by Articulate Storyline 3. The results of the one-sample t-test obtain a significance value (2-tailed) of 0.00. These results show a significance value of less than 0.05 or $p < 0.05$, which means H_0 is rejected and H_a is accepted. Therefore, there is a significant difference in the ability to understand the science concept of Earth and the Universe material for fifth-grade students of SD Negeri 4 Tamblang before and after studying with the PBL model-based Appsmart learning application.

Discussion

The results of this development research show that there are several findings in the research, including the level of eligibility of the media, obtaining a score of 4.67, and the eligibility of the material, obtaining a score of 4.65 with very good eligibility qualifications, the level of practicality achieved by the teacher is 4.87. The practicality of students is 4.97 with very good qualifications, and the Appsmart learning application based on the PBL model assisted by Articulate Storyline 3 effectively increases the understanding of natural science concepts in Earth and the Universe material. These results show that the Appsmart learning application based on the PBL model has characteristics compared to other learning applications because it is designed with a Problem-Based Learning (PBL) model orientation (Indra & Fitria, 2021; Rati et al., 2022). The topic of material in the Appsmart learning application is only devoted to Earth

and the Universe material, whereas the content in Appsmart will be related to the PBL model. The PBL model is an approach to the learning process that links concrete problems as a context for students so that they learn about critical thinking and problem-solving skills and acquire essential knowledge and concepts from the subject matter (Anjelina, Putri, 2018; Elfina & Sylvia, 2020; Yuniar & Hadi, 2023). The students' perception or understanding makes the model very suitable for improving students' problem-solving skills.

Problem-solving skills are needed in the science learning process. This is because, in science learning, students are required to be able to think critically and creatively to solve various problems that exist in the environment (Khasna & Muh, 2020; Pakpahan et al., 2022). In addition, science learning is also carried out to develop students' skills in understanding scientific processes and methods so that later, students can apply a scientific attitude to know the natural world around them (Azis et al., 2020; Wulandari et al., 2021). Learning characteristics that invite students to get to know nature and all its contents broadly will certainly be facilitated by the application of appsmart learning applications. This is because learning applications can load various content in images, audio, and video, making it easier for students to understand the material presented (Afrizal, 2017; Sutejo & Yogi, 2021). The Appsmart learning application based on the PBL model on Earth and the Universe material is in line with Ausubel's learning theory, which is synonymous with meaningful learning, namely associating the knowledge they already have with the subject matter being studied so that new concepts are easily absorbed by students (Ardiani, 2022). The learning theory introduced by David P. Ausubel states that to help students understand a material being studied, it is necessary to link the material to be studied with concepts that students have previously possessed (Putra & Wulandari, 2021).

The results obtained in this study align with previous research results, which also revealed that social studies learning applications are very feasible to use in the learning process (Permana & Sujana, 2021). Other studies revealed that android-based biology learning media on excretory system material for grade eight junior high schools was declared valid and feasible to use in the learning process (Elci et al., 2021). Further research revealed that problem-based learning (PBL) interactive learning multimedia using the articulate storyline application on chemical bonding material was declared feasible and could be used as a medium and learning resource for students (Rati et al., 2022). Based on the results of this research, it can be said that learning applications can positively influence student learning processes.

4. CONCLUSION

Based on the results of data analysis and discussion, it can be concluded that the Appsmart learning application based on the PBL model assisted by Articulate Storyline 3 on Earth and the Universe material is effectively developed to improve understanding of science concepts in the Earth and Universe material for fifth-grade elementary school students.

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