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Development of POBI Interactive Learning Media Based on Articulate Storyline 3 on Arithmetic Sequences and Series for Junior High School Students

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Abstract. *Mathematics instruction still relies heavily on conventional teaching methods dominated by lectures, which results in low student engagement in the learning process and poor delivery of the material. One area of mathematics that requires instructional innovation is arithmetic sequences and series, as the material is quite complex and requires students to think logically to identify patterns. However, there is currently no interactive learning media specifically designed for this topic. Based on this problem, the researcher aims to develop a valid, practical, and effective POBI interactive learning media based on Articulate Storyline 3 for arithmetic sequences and series for eighth-grade junior high school students. This study employed the Research and Development (R&D) method using the ADDIE model. The test subjects consisted of 32 eighth-grade students at State Junior High School 8 Malang. The research instruments used included a final achievement test, student and teacher response questionnaires, and a validation sheet. The results showed that the POBI media was deemed highly valid with a validity rate of 89.85%. The practicality of the media, as assessed by teacher responses (90%) and student responses (90.5%), was classified as highly practical. In contrast, its effectiveness, as measured by the percentage of students meeting the minimum competency standard (KKM) on the final proficiency test, reached 90.62%. This study concludes that the POBI media is suitable as an alternative solution in the innovative mathematics learning process, providing a learning experience that engages students and helps them understand the material on arithmetic sequences and series.*

Keywords: *Interactive Learning Media, Articulate Storyline 3, Arithmetic Sequences and Series, POBI.*

INTRODUCTION

Mathematics is a branch of science that combines logical theory with practical application, making it crucial in many sectors. Its development continues to be strengthened to support technological advancements and other fields of study (Yuman et al., 2023). Mathematics education helps students develop critical and logical thinking skills and fosters collaboration in problem-solving (Jainuri et al., 2023). Therefore, mathematics has been designated as a required subject at all levels of education (Kemendikbudristek, 2024). Ideally, teachers should design

mathematics instruction that develops students' potential, provides opportunities for students to engage actively in the learning process, and aligns with technological advancements (Winanti, 2026).

In reality, mathematics instruction is still dominated by conventional approaches (Zulfa & Mahmudah, 2025). Conventional instruction relies largely on lectures and practice problems. This results in material not being conveyed effectively and student engagement in the learning process remaining relatively low (Agustina & Andriani, 2025). As an alternative approach to address these issues, interactive learning media are considered to help educators design innovative and creative learning experiences (Razilu & Saputra, 2025). Interactive learning media are tools that connect participants and ensure the learning process involves communication among more than one person. Through active collaboration, teachers and students can work together to achieve the desired learning objectives (Cahyaningtias & Ridwan, 2021). Additionally, interactive learning media can help educators convey information so that classroom learning is easier to understand, more engaging, and more active (Sakti et al., 2024).

One software program that can be used to develop interactive learning media is Articulate Storyline 3; this software serves as a tool for designing comprehensive and creative presentations of learning materials. The final products created with Articulate Storyline 3 are web-based or mobile applications. Web-based learning media can stimulate active and enjoyable learning activities to help students grasp, retain, and restate the material, making learning more meaningful (Nisa & Yulianto, 2025). The software operates similarly to Microsoft PowerPoint, making it easy for educators to design learning materials. Its key advantage lies in its game-based features, which do not require complex scripting and are accessible via smartphones, thereby facilitating independent learning for students (Rachmawati et al., 2023).

Based on observations and interviews with mathematics teachers at State Junior High School 8 Malang, it was found that the classroom learning process has utilized technology such as projectors to display material. However, its use remains limited and has not yet encouraged active student engagement. As teacher noted

during an interview: "*I usually deliver lessons through lectures and PowerPoint slides. Students tend to simply listen, so they are not very active.*" Additionally, there are no specific interactive learning media for arithmetic sequences and series. In fact, this material is quite complex because it requires logical thinking to identify general patterns in number sequences (Lorenza, 2024). This results in students having difficulty understanding the concepts involved. Therefore, there is a need to develop interactive learning media that are engaging and relevant to students' needs.

Previous research by Cardoso et al. (2025) showed that the development of learning media based on Articulate Storyline 3 achieved a validity score of 4.73, which falls within the "valid" category. The practicality of the media scored 4.89 in the practicality criteria. Meanwhile, the effectiveness of the media in supporting the learning process was evident in a 100% learning achievement rate, falling within the "effective" category. Similarly, the study by Yance et al. (2025) also demonstrated that Articulate Storyline 3-based instructional media is suitable, achieving a validity score of 4.50 based on validator assessments. As for its practicality, it received a score of 4.83 from teachers and 4.36 from students, thus falling into the "practical" classification. The media was also proven effective based on the students' final evaluation pass rate, which reached 77%. The POBI media in this study was designed to guide students in discovering formulas independently, rather than simply presenting them directly.

Based on the discussion above, the researcher aims to develop a valid, practical, and effective POBI interactive learning media based on Articulate Storyline 3 for arithmetic sequences and series material for junior high school students. If these objectives are achieved, this study is expected to enrich the literature on the development of interactive mathematics learning media—particularly those based on Articulate Storyline 3—by offering an alternative design that emphasizes the discovery of formulas rather than their direct presentation. In practical terms, the resulting POBI media is expected to serve as a reference for mathematics teachers in designing innovative, engaging, and technology-based lessons, particularly on the topic of arithmetic sequences and series. Furthermore,

if the media proves to be valid, practical, and effective, it has the potential to be adapted and expanded to other mathematics topics or grade levels, as well as tested on a larger scale in future research.

RESEARCH METHOD

The research method used is Research and Development (R&D), which focuses on producing and testing the effectiveness of the developed product (Sugiyono, 2023). Furthermore, the ADDIE model was selected because its process is considered structured, systematic, and grounded in the theoretical foundations of instructional design (Safira et al., 2021). The stages of this model include analysis, design, development, implementation, and evaluation (Branch, 2009).

This study was conducted during the even semester of the 2025/2026 academic year at State Junior High School 8 Malang. The subjects of this study were 32 eighth-grade students.

Analyze

The analysis phase aims to identify possible causes of the problem (Branch, 2009). The researcher conducted observations to analyze instructional media needs and student characteristics, and conducted content analysis to align media content so the material presented is relevant to students.

Design

The design phase aims to verify the work process and the selection of testing methods (Branch, 2009). The researcher developed an initial concept for the learning media, including the media's name and theme, media flowcharts, and screen layout sketches (storyboard). Next, the researcher developed research instruments, including final achievement test questions, teacher and student response questionnaires, and validation sheets.

Development

The development phase aims to create the product while testing its feasibility (Branch, 2009). The POBI educational media was developed using Articulate Storyline 3. Following this, subject matter experts and media experts conducted validation. This process was conducted to assess the media’s feasibility

and gather suggestions for improvement to refine the media before pilot testing. The results of the media validation were presented by calculating the ratio of the total score obtained to the maximum possible score, then multiplying by 100%. The calculation formula is as follows.

$$P = \frac{\sum x}{\sum x_1} \times 100\%$$

Explanation:

P = Percentage of the score obtained

x = Score obtained

x_1 = Maximum score obtained

After obtaining the validity percentage, the study then referred to the validity criteria listed in Table 1. The medium was deemed suitable for testing if the percentage obtained was above 60%, with a minimum category of "good."

Table 1. Media Validity Indicators

Percentage	Category
$80\% < P \leq 100\%$	Very good/Very valid
$60\% < P \leq 80\%$	Good/Valid
$40\% < P \leq 60\%$	Fair/Moderately valid
$20\% < P \leq 40\%$	Poor/Invalid
$0\% < P \leq 20\%$	Invalid

(Sholehah & Listiawan, 2025)

Implementation

The implementation stage aims to provide a learning environment and engage students (Branch, 2009). The pilot study was conducted at State Junior High School 8 Malang, involving 32 eighth-grade students as subjects. In this stage, students took a final proficiency test to measure the effectiveness of the media, followed by the completion of student and teacher response questionnaires to assess the practicality of the media.

Evaluation

The evaluation stage aims to assess the quality of the product and the learning process that took place (Branch, 2009). Evaluations were conducted at the end of each stage before proceeding to the next, as well as at the end of the process after the media had been fully utilized, to ensure that the objectives of the media

development had been achieved. One aspect of the evaluation involved analyzing the practicality of the media based on the results of the student and teacher response questionnaires, as well as analyzing the effectiveness of the media based on the results of the final proficiency test.

The results regarding the practicality of the media are presented by calculating the ratio of the total score obtained to the maximum score, then multiplying by 100% using the formula below.

$$P = \frac{\sum x}{\sum x_1} \times 100\%$$

Explanation:

P = Percentage of score obtained

x = Score obtained

x_1 = Maximum score obtainable

After obtaining the practicality percentage, the researchers then referred to the practicality criteria listed in Table 2. A medium was deemed practical if the percentage obtained was above 60%, with a minimum rating of "good."

Table 2. Media Practicality Indicators

Percentage	Category
$80\% < P \leq 100\%$	Very good/Very practical
$60\% < P \leq 80\%$	Good/Practical
$40\% < P \leq 60\%$	Not very good/Fairly practical
$20\% < P \leq 40\%$	Poor/Not practical
$0\% < P \leq 20\%$	Not practical

(Sholehah & Listiawan, 2025)

Final exam results were analyzed to assess the effectiveness of the instructional media in the learning process; the media were considered effective if 75% of students achieved the minimum passing score (KKM) of 78, using the following calculation formula (Fajarwati et al., 2023).

$K = \frac{Number\ of\ passed\ students}{Total\ number\ of\ students} \times 100\%$, where K is the percentage of students meeting the minimum competency standard.

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RESULTS AND DISCUSSION

This section presents the results of developing the POBI interactive learning media designed using the ADDIE model.

Analyze

In the analysis phase, the first aspect analyzed was student needs. After conducting observations, the researchers found that instruction was still limited to the use of textbooks and PowerPoint presentations, causing students to feel confused when trying to understand the material solely from textbooks, and they quickly became bored when instruction was teacher-centered. Teachers recognized the need for interactive learning media in the instructional process. This is because the use of interactive learning media can help students understand the material better and encourage them to be more actively engaged in the learning process. Research conducted by Oktaviani & Nurhamidah (2023) shows that interactive learning media can make lesson messages clearer, thereby making the learning process more effective.

Furthermore, an analysis of the characteristics shows that students are more enthusiastic when learning involves technology. This is evident when students take quizzes on their cell phones; they seem more enthusiastic than when they take quizzes by hand on paper. According to Mahmudah et al. (2024), the use of technology can make abstract mathematical concepts more concrete through real-world examples. An analysis of the curriculum content revealed that the topics studied were Arithmetic Sequences and Series, implemented under the Merdeka Curriculum. The observations activities are documented in Figure 1.



Figure 1. Observations

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Design

At this stage, the researcher named the developed media POBI. In addition to serving as the name of the media, POBI also serves as the name of a character within the media. Next**,** the researcher designed a flowchart to illustrate the workflow and sequence of operations within the program (Burhanuddin, 2024). The designed flowchart begins with a home page featuring a "Start" button to direct users to the login page. After that, users are taken to the main page, which includes buttons leading to the user guide and learning objectives pages. Next, the menu page contains several buttons leading to the content, sample questions, interactive quizzes, and reflection pages. Afterward, the researcher designed a storyboard using the Canva application. The storyboard serves as a reference framework for the media, outlining the layout of all its pages (Ode et al., 2023). The flowchart and storyboard is shown in Figure 2.

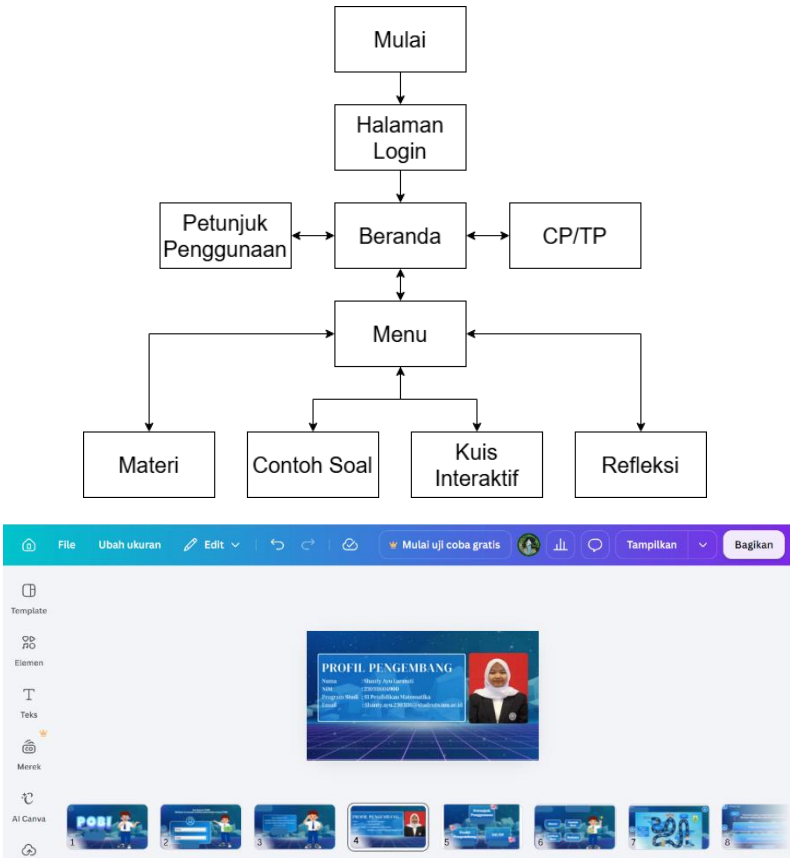


Figure 2. POBI Flowchart

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Development

At this stage, the media was developed using Articulate Storyline 3 and can be run in both HTML5 and APK formats. Development began with the opening page, followed by the login page. On the login page, users must enter their name and class before proceeding to the next page. The results are shown in Figure 3.



Figure 3a. Opening page



Figure 3b. Login page

Next, the user guide page explains the functions of each button in the POBI media. See Figure 4.

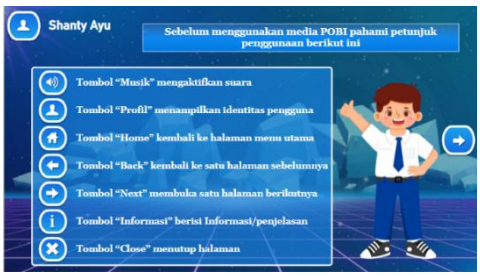


Figure 4. User guide page

After that, the content section features the activities “Let’s Understand” and “Exploring Formulas.” The “Let’s Understand” activity contains explanations of arithmetic sequences and series, including definitions and examples of their application in daily life. Furthermore, the “Exploring Formulas” section is designed with an adventure theme. Starting at Station 1, users discover the formula for arithmetic sequences; then, at Station 2, they discover the formula for arithmetic series. Users must complete Station 1 before proceeding to Station 2. The content is presented step-by-step to ensure no material is missed, so that users understand

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the entire topic before moving on to the next stage. The results are shown in Figure 5.



Figure 5a. Content page



Figure 5b. Let's Understand page



Figure 5c. Exploring Formulas page

On the interactive quiz page, there are three levels with varying degrees of difficulty. Each question is accompanied by automatic feedback for each student's response, providing an interactive learning experience. Additionally, the score for each level automatically appears at the end of the quiz. Results are shown in Figure 6.



Figure 6a. Quiz page



Figure 6b. Score results page



Figure6c.Correct Feedback



Figure 6d. Incorrect Feedback

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In the reflection section, students are given open-ended questions to express what they have understood and learned after using the POBI media. Results are shown in Figure 7.

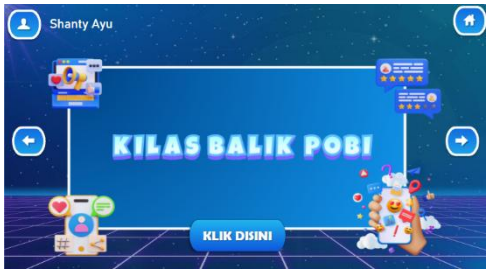


Figure 7. Reflection Page

Next, the POBI media was submitted to validators for evaluation. The validators consisted of two people: a mathematics teacher at State Junior High School 8 and a lecturer from Universitas Negeri Malang. The results of the expert validation are presented in Table 3 and Table 4.

Table 3. Expert Validation Results for the Media

	Statement	Validator 1	Validator 2
1.	The color combinations in the POBI learning materials are attractive.	5	5
2.	The font choice is clear in POBI's learning materials.	5	5
3.	The font size in the POBI learning materials is clear and easy to read.	5	5
4.	Appropriateness of the illustrations in the POBI learning materials.	5	4
5.	Appropriateness of the background music used in POBI learning media.	5	5
6.	Ease of access and operation of the POBI learning media.	4	4
7	The instructions for using the POBI learning media are clear and easy to understand.	4	4
8	POBI's interactive learning materials are easy to use at any time.	4	5
9	POBI's learning materials make it easy to understand arithmetic sequences and series.	4	5
	Total score obtained	**41**	**42**
	Percentage of score %	**91.1%**	**93.3%**

In Table 3, which presents the media expert validation results, Validator 1 (91.1%) falls into the "highly valid" category, and Validator 2 (93.3%) falls into the "highly valid" category. Therefore, the average percentage for both validators is 92.2% in the "highly valid" category.

Table 4. Results of Content Expert Validation

Statement	Validator 1	Validator 2
1. Alignment of the content in the POBI learning media with the Learning Outcomes and Learning Objectives.	5	5
2. The scope of the content included in the POBI learning media is appropriate.	5	5
3. The alignment of the POBI learning media with the material being taught.	4	5
4. The material presented in the POBI learning media is clear and easy to understand.	4	5
5. Students' ease in understanding the concept of arithmetic number patterns through the POBI learning media.	4	4
6. The appropriateness of the questions/activities in the POBI learning media.	4	4
7. The material presented sparks students' curiosity.	4	4
8. The content in the POBI learning media can boost students' enthusiasm for learning.	4	4
Total score obtained	**34**	**36**
Percentage of score %	**85%**	**90%**

In Table 4, which presents the subject matter expert validation results, Validator 1 had an (85%) "highly valid" rating, and Validator 2 had a (90%)"highly valid" rating. Therefore, the average percentage for both validators is 87.5% "highly valid."

Next are the media expert's recommendations for POBI. The results of the revisions are shown in Table 5.

Table 5. Media Expert Revisions

Before Revision	After revision
 Separate the CP/TP section menu and instructions at the top of the page before the menu	 Revised according to the suggestion
 Added page section descriptions	 Revised according to suggestions

The subject matter expert's recommendation for improving POBI is to reduce the number of questions at each level—from the original 10 questions per level to 5 questions per level. This is intended to prevent burnout and reduce students' academic workload.

Based on the analysis of Tables 3 and 4, the average score for all aspects was 89,85%, falling into the "highly valid" category. These scores are supported by POBI's clean and clear design. The combination of colors, illustrations, and font sizes makes the platform easy to use. In terms of content, the material is presented in a logical sequence aligned with the learning objectives, enabling students to grasp mathematical concepts accurately. Furthermore, as shown in Table 5, the media has been revised according to the media expert's suggestions. Therefore, the POBI media is suitable for pilot testing.

Implementation

The implementation phase was conducted at Malang Public Junior High School No. 8, involving 32 eighth-grade students as research subjects. This activity took place in two sessions, each lasting 2 class periods (2 × 40 minutes). During the first session on May 11, 2026, the students were introduced to the POBI interactive

learning media. During the first session, students were encouraged to explore the material—specifically, to understand what arithmetic sequences and series are and to discover the formulas for them. The second session took place the following day, May 12, 2026, during which students continued using the tool. In the second session, students continued studying example problems presented step by step, completed interactive exercises that provided immediate feedback and scores upon completion, and engaged in reflection. At the end of the learning process, a final proficiency test was administered. After the session ended, both students and teachers filled out feedback questionnaires regarding their experiences with the POBI interactive learning media. Throughout this process, the teacher acted as a facilitator, guiding the students and ensuring that the learning proceeded according to plan. During the learning process, the students demonstrated enthusiasm and active engagement, as evidenced by their eagerness to explore the material, ask questions, and complete the interactive practice problems provided.



Figure 8. Implementation Phase

Evaluation

In the evaluation phase, the researcher assessed the achievement of the media development objectives, including the effectiveness of the media as determined by the percentage of students who met the minimum passing score on the final proficiency test. The results are shown in Table 6.

Table 6. Percentage of final proficiency test scores

Aspect	Number
Total Number of Students	32
Average Score	87.8
Lowest Score	40
Highest Score	100
Students Whose Scores Have Not Met the Minimum Passing Score	3
Students Whose Scores Meet the Minimum Passing Score	29

Table 6 shows that after using the POBI media, 90.62% of students met the minimum passing score, indicating that the POBI media is effective when applied in the learning process. These results were supported by a step-by-step presentation of the material, in which students were actively involved in deriving the formulas for arithmetic sequences and series to ensure that every student fully understood the formulas, and were given interactive quizzes at appropriate difficulty levels rather than being immediately presented with difficult problems.

The students' achievement results indicate that the activities on the arithmetic sequences and series formulas in Stations 1 and 2 can help students understand the origins of these formulas rather than simply memorizing them. In addition, interactive quizzes can gradually manage the learning load so students do not get bored quickly, and immediate feedback on each student's answer and the score at the end of the quiz can help students reflect independently on their level of understanding.

Next, the media's practicality was assessed using student and teacher response questionnaires. The teacher response questionnaire used a 1–5 Likert scale, while the student response questionnaire used a 1–4 Likert scale. The results regarding the practicality of the media are presented in Tables 7 and 8.

Table 7. Results on the Practicality of the Media for Mathematics Teachers

	Statement	Score
1.	Alignment of the content in the POBI learning materials with the Learning Outcomes and Learning Objectives.	5
2.	Clarity of information in the media.	5
3.	Language used in the media.	5
4.	Students' motivation to learn after participating in lessons using media.	5
5.	Clarity of the learning topic.	4
6.	The font (type and size) used in the POBI learning materials is clear.	4
7.	The availability of engaging illustrations, graphics, images, and photos,	4
8.	The media has an attractive layout.	4
Total score obtained		**36**
Percentage of score %		**90%**

Table 8. Students' Practical Application Results

	Statement	Average
1.	The appeal of POBI's color combinations and design.	3.75
2.	Clarity of the images and text presented in POBI.	3.62
3.	Ease of use of POBI on a cell phone or laptop	3.53
4.	Clarity of POBI usage instructions.	3.62
5.	Alignment of the materials provided in POBI with the learning objectives	3.69
6.	Ease of understanding the sample questions	3.47
7.	Ease of the language used in POBI	3.75
8.	POBI helps me feel more motivated to learn	3.59
9.	POBI makes me more interested in learning after using it	3.59
10.	The ease of accessing POBI independently at any time.	3.59
Total score obtained		**36.2**
Percentage of score %		**90.5%**

In Table 7, 90% of math teachers rated the practicality of the media as "very practical." Furthermore, in Table 8, 90.5% of students rated the practicality of the media as "very practical." These figures indicate that the POBI interactive learning media was well-received by its users. This finding is consistent with the research by Silmi et al. (2023), who also reported similar results from the development of Articulate Storyline 3-based mathematics media using a scientific approach for junior high school students, with practicality reaching 90.43% in a small-group pilot test (very practical) and 83.96% in a field test (practical). Supported by the research by Saputro & Lumbantoruan (2020), who developed Articulate Storyline 3-based instructional media on flat-sided three-dimensional shapes for eighth-grade students, the media was deemed suitable for use with an average expert validation score of 4.48 in the "highly valid" category.

However, these findings do not fully align with those of some other studies. Febriyanti et al. (2025), for example, reported that differentiated instruction using Articulate Storyline 3 achieved a mastery rate of only 53.85% in the first cycle—still far below the 75% target. The main challenge was that students were not yet accustomed to interactive media, and their engagement remained low. Students also focused more on the technical aspects of using the media than on understanding the mathematical content. This situation differs from the present study, in which POBI

achieved a mastery rate of 90.62%. This difference may stem from variations in research design, students' technological readiness, and the clarity of instructions within the media. In this study, POBI was designed with a coherent and step-by-step flow so that students were guided to discover the formulas—a factor that may have contributed to its higher effectiveness.

CONCLUSION

This study has successfully developed a valid, practical, and effective Articulate Storyline 3-based POBI learning resource on arithmetic sequences and series for eighth-grade junior high school students. This success is demonstrated by the expert validation result of 89.85% highly valid, the practicality questionnaires for teachers 90% and students 90.5% both rated as highly practical, and the effectiveness of the media, as evidenced by the final achievement test results, where 90.62% of students met the minimum passing score. POBI has proven to assist students in learning abstract mathematics through formula discovery and interactive quizzes. However, this study is still limited to the test subjects at State Junior High School 8 Malang. A recommendation for future research is to expand the pilot study to other schools.

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