Edumatica: Jurnal Pendidikan Matematika
Volume 13 Number 01 April 2023

Submited : 16 November 2022
Revised : 08 May 2023
Accepted : 28 May 2023

Pengembangan Multimedia Pembelajaran Interaktif Berbasis Articulate Storyline 3 pada Materi Aritmetika Sosial Siswa Kelas VII SMP Negeri 12 Merangin

Muhammad Jainuri[1], Ade Susanti[2], Awatif[3], Yohanes[4]
[1,2,3,4]Pendidikan Matematia, Universitas Merangin, Indonesia
E-mail: egydia2004jen@gmail.com[1], ade_adza85@yahoo.co.id[2], awatifmate89@gmail.com[3]

Abstract

Penelitian ini bertujuan untuk mengembangkan multimedia pembelajaran interaktif berbasis *articulate storyline 3* pada materi aritmetika sosial siswa kelas VII SMP Negeri 12 Merangin yang valid, praktis, dan efektif. Penelitian ini menggunakan metode penelitian dan pengembangan dengan model APPED. Multimedia pembelajaran interaktif ini telah divalidasi oleh lima orang ahli. Validitas dilihat dari lembar validasi, kepraktisan lembar respon dan wawancara siswa, sedangkan keefektifan hasil belajar dan aktivitas belajar siswa. Hasil penelitian menunjukkan rata-rata skor validasi ahli materi matematika 4,25 dengan kategori sangat valid, ahli bahasa Indonesia 3,90 dengan kategori sangat valid, ahli media 4,76 dengan kategori sangat valid, dan validasi guru matematika 4,76 dengan sangat valid. kategori. sah. Nilai validitas keseluruhan adalah 4,50 dengan kategori sangat valid. Perolehan proporsi tanggapan siswa sebesar 82,28% pada kategori praktis. Persentase hasil belajar klasikal sebesar 81,8% pada kategori efektif dan rata-rata persentase keaktifan siswa sebesar 68,65% pada kategori aktif. Berdasarkan hasil penelitian dan pengembangan dinyatakan bahwa multimedia pembelajaran interaktif valid, praktis, dan efektif.

Kata Kunci: APPED model, articulate storyline 3, multimedia pembelajaran interaktif

Development of Interactive Learning Multimedia Based on Articulate Storyline 3 on Social Arithmetic Materials for Class VII Students of SMP Negeri 12 Merangin

Abstract

This study aims to develop interactive learning multimedia based on articulate storyline 3 on social arithmetic material for class VII students of SMP Negeri 12 Merangin which is valid, practical, and effective. This study uses research and development methods with the APPED model. These interactive learning multimedia was validated by five experts. Validity is seen from the validation sheet, the practicality of the response sheet and student interviews, and the effectiveness of learning outcomes and student learning activities. The results showed that the average score for the validation of mathematicians was 4.22 with a very valid category, Indonesian language experts 3.88 with a very valid category, media experts 4.78 with a very valid category, and teacher validation. mathematics 4.80 with a very valid category. The overall validity score is 4.58 with a very valid category. The proportion of students' responses was 82.27% in the practical category. The percentage of classical learning outcomes is 77.3% in the effective category and the average percentage of student activity is 68.64% in the active category. Based on the results of research and development, it was stated that interactive learning multimedia was valid, practical, and effective.

***Keywords**: APPED models; articulate storyline 3; interactive learning multimedia*

INTRODUCTION

The rapid advancement of technology has led to significant changes in various aspects of life, necessitating high adaptability to avoid being left behind and overwhelmed by these changes. This is particularly crucial due to the demand for 21st-century skills, the Fourth Industrial Revolution (Industry 4.0), and the ongoing Covid-19 pandemic. These impacts are felt across all fields, including education.

Education serves as a vital indicator of a nation's progress and civilization. To ensure the provision of high-quality education, it is essential to adequately prepare the various components that support the educational system. A crucial element that significantly influences the quality of education is an effective learning process. Besides having suitable facilities and infrastructure, such as information and communication technology (ICT), the presence of qualified human resources is of utmost importance. This is particularly true for subjects like mathematics, which serve as the foundation for numerous scientific disciplines.

Learning mathematics cultivates logical, analytical, systematic, critical, and creative thinking skills, as well as the ability to collaborate in problem-solving. According to the National Council of Teachers of Mathematics (NCTM), students should possess the following abilities when learning mathematics: understanding concepts, problem-solving, communication, and making connections (Maulyda, 2020). Mathematics education focuses on nurturing students' mathematical abilities, which include exploring, formulating conjectures, reasoning logically, solving non-routine problems, communicating mathematically, and relating mathematical concepts to other intellectual activities (Sumarmo, 2000).

Based on the above, in order for students to achieve positive learning outcomes in mathematics, they need to comprehend the concepts of the materials they are studying. Once they have grasped the concepts, students should be able to develop problem-solving and reasoning skills, and effectively communicate their understanding within relevant contexts. Ultimately, the aim is to foster students' positive attitudes toward mathematics, boosting their confidence in problem-solving and resulting in overall improved learning outcomes.

However, empirical evidence indicates that student learning outcomes in mathematics are still low. This is evident from tests administered at SMP Negeri 12 Merangin, where 5 questions were used to assess daily learning outcomes. The test results revealed that only 3 out of 34 students were able to solve the questions correctly. Among the remaining students, 10 managed to complete 2 questions satisfactorily, while others attempted the questions but did not achieve the expected answers. Furthermore, 12 students failed to provide any correct answers; their responses lacked clarity and contained errors. Most concerning, 9 students only provided the questions without any answers. These results underscore the numerous obstacles faced by students in their learning process.

One significant obstacle is the continued use of conventional lecture-based teaching methods. In this approach, students are accustomed to receiving information passively from the teacher. The teacher delivers the material orally, while students listen. Afterwards, the teacher provides sample questions and assigns practice exercises. The interaction between teacher and students often follows a one-way pattern, with questions posed by the teacher and students providing answers. Unfortunately, opportunities for students to ask questions are infrequent.This results in students being passive, easily bored, lacking initiative, and depending on the lecturer. According to Purwoto (Dr. Amin & Linda Yurike Susan Sumendap, 2022) conventional learning has drawbacks, namely: boring learning, passive students, the density of the concepts given results in students not being able to master the material being taught, the knowledge gained is forgotten more quickly, and lectures cause students to learn to memorize which does not result in the emergence of understanding.

Based on the aforementioned issues, it is essential to identify effective strategies for enhancing student learning outcomes. Overcoming these challenges is crucial to ensure a successful learning process that aligns with educational objectives. To address this, an ideal approach to mathematics education should adhere to Process Standard No. 41 of 2007, which emphasizes flexible, varied, and standardized learning experiences. Furthermore, it should be interactive, inspiring, enjoyable, challenging, and motivate students to actively participate while allowing space for initiative, creativity, and independence based on individual talents, interests, and psychological and physical development.

Print ISSN: 2 088 -2 157 , Online ISSN: 2580-0779

One potential model that can help overcome these obstacles and improve student learning outcomes is the learning cycle.

Selecting the appropriate learning model can enhance the meaningfulness and interactivity of the learning process. The choice of a learning model should consider factors such as the subject matter, student characteristics, diverse student abilities, available resources and media, the demands of 21st-century skills, and Industry 4.0 requirements. The learning cycle is a model that is believed to bridge these aspects effectively.

The learning cycle was initially introduced by Robert Karplus in the Science Curriculum Improvement Study (SCIS). As described by Santoso (2005), the learning cycle is a process that facilitates the acquisition and rearrangement of new concepts in students' knowledge. It follows the constructivist model based on Piaget's learning theory. According to Slavin (Kadarwati & Rulviana, 2020), constructivism emphasizes that students must construct and transform complex information themselves to internalize it.

Initially comprising three stages - exploration, concept introduction, and concept application - the learning cycle has evolved into five stages: engagement, exploration, explanation, elaboration/extension, and evaluation, as described by Lorsbach (in Wena, 2011: 171). These stages are defined as follows: (1) Engagement: This stage aims to capture students' attention, foster thinking skills, and activate their prior knowledge by posing questions related to the theme or topic to be studied (2) Exploration: Students work independently or in groups without direct instruction from the teacher. They manipulate objects, conduct experiments, make observations, gather data, and draw conclusions from their experiments. The teacher acts as a facilitator, supporting students in tackling the problem at hand (3) Explanation: The goal is to enhance, refine, and develop students' understanding of the acquired concepts. The teacher explains the concept, provides relevant examples, and may introduce new terms if necessary. (4) Elaboration: Students are encouraged to apply the concepts and skills they have acquired in new situations. This stage aims to deepen students' understanding and foster connections between concepts, leading to more robust comprehension. (5) Evaluation: The teacher assesses students' knowledge and understanding of the newly introduced concepts. Students can also engage in self-evaluation by asking open-ended questions and seeking answers based on their previous observations, evidence, and explanations. Through self-evaluation, students can identify areas for improvement or progress in their learning process.

In addition, the *learning cycle learning model* in this study was assisted by interactive learning multimedia using *the articulate storyline 3 programs*. *Articulate Storyline 3* is an *authoring tool* that is quite good for developing interactive learning multimedia with content that can be in the form of text, images, graphics, sound, animation, and video. *Articulate Storyline 3* has features similar to *Microsoft Powerpoint.*

Multimedia is a combination of text, video, audio, and images, and is packaged into digital files that are used to convey messages to the public. In addition, interactive learning multimedia is a combination of text, images, graphics, sound, video, animation, and simulation in an integrated and synergistic manner assisted by certain computer programs and is interactive to achieve learning objectives. Based on this explanation it can be concluded that interactive learning multimedia is a learning multimedia program whose users can operate the program directly so that it can cause stimulation, and users can receive and process information that can be retained in their memory.

The interactive learning multimedia components according to (Dwi Surjono, 2017) include the Introduction, consisting of: (1). Title page, (2). Menus, (3). Learning objectives, (4). Instruction. Content/material, consisting of: (1). Control, interaction, navigation, (2). Text, sound, images, videos, animations, simulations. Cover, consisting of (1). Summary, (2). Exercise and evaluation.

The interactive learning multimedia developed in this study uses the *Articulate Storyline 3* program which is an *authoring tool. Articulate Storyline 3* has quite complete features by combining text, images, graphics, sound, animation, and video. Interactive learning multimedia developed using *Articulate Storyline 3* can be published as web-based media (html5) that can be run on various devices. The media output is in the form of an application file and can be opened on computers, laptops, tablets, and smartphones, based on the Windows, macOS, Linux, Android, and IOS operating systems.

Articulate Storyline 3 can be downloaded from the official URL articulate website: https://articulate.com/perpetual/downloads. Instructions for using the features in the *Articulate Storyline 3 program* can be seen in the *Help tab* of the program. To be able to install *Articulate Storyline 3*, you need a computer/laptop with the following specifications: a processor with a minimum CPU speed of 2 GHz, 2 GB of RAM, 1 GB of disk space, a display with a resolution of 1280 x 800 px, sound card, microphone and webcam to record narration and videos. While *the software* required is a minimum *Windows operating system Windows 7* (32 or 64bit platform), *MacOS X 10.6.8* or higher, *Net framework 4.5.2, Visual C++*, and *Adobe Flash Player 10.3* or above.

Based on the explanation above, the authors conducted research on the development of interactive learning multimedia based on *articulate storyline 3* on social arithmetic material for class VII students of SMP Negeri 12 Merangin.

METHOD

This research is research and development (Research and Development). Research and development aims to produce new products through the development process. This is following the opinion of Sudaryono (2016: 15) which states that *Research and Development (R&D)* is a research method used to produce products and test their effectiveness. This research uses the APPED development model. The APPED model consists of 5 stages, namely analysis and initial research, design, production, evaluation, and dissemination. This Articulate Storyline 3-based learning application was validated by 3 experts, namely material experts, media experts, and linguists. The subjects for the product trial were 34 class VIII B students of SMP Negeri 12 Merangin.

The research instrument used was an instrument to measure the validity, practicality, and effectiveness of *Articulate Storyline 3-based learning applications.* The validity was known from the validation sheet, practicality from the results of student response questionnaires and student interviews, and the effectiveness was known from the learning outcomes questions and student activity observation sheets when participating in learning using interactive multimedia learning based on Articulate Storyline *3.*

Validity analysis was carried out using the formula disclosed (Fitri, 2014): $R=\sum_{i=1}^{n} V_i$, with R = the average of the validators' assessment results, V_i = the score of the i-th validator's assessment results, and n = the number of validators. The criteria for determining validity are listed in Table 1 below:

Table 1. Criteria for the Validity of Articulate Storyline-Based Interactive Learning Multimedia *3*

Score	Category
average> 3,20	Very Valid
2,40 <average≤ 3,20	Valid
1,60 <average≤ 2,40	Valid Enough
0,80 <average≤ 1,60	Invalid
average≤ 0,80	Invalid

Practicality analysis was carried out according to the following formula: $NP = \frac{R}{SM} x\,100\%$, NP = The percent value sought, R = Raw score obtained, SM = Maximum score, and 100 = fixed number. The criteria for determining practicality are listed in Table 2 below:

Table 2. Practicality Criteria for *Articulate Storyline-Based Interactive Learning Multimedia 3*

Achievement Rate (%)	Category
86 – 100	Very Practical
76 – 85	Practical
60 – 75	Pretty Practical
55 – 59	Less Practical
≤ 54	Impractical

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The value of student learning outcomes after learning to use interactive multimedia learning based on articulate storyline 3 is obtained by converting the scores obtained by students using the following formula (Purwanto, 2010): $S = \frac{R}{N} \times 100$, with S = Value sought, R = Score obtained by each student, and N = Total score.

To determine the effectiveness of interactive multimedia learning based on articulate storyline 3 in terms of student learning outcomes classically using the following formula: $NP = \frac{R}{SM} \times 100\%$, with NP = percent value sought, R = number of students who scored ≥ 75, SM = total number students, and 100 = fixed number. The criteria for determining the effectiveness of interactive learning multimedia based on articulate storyline 3 according to (Rahmawaty, 2013) as follows:

Table 3. Criteria for Effectiveness of Interactive Learning Multimedia Based on *Articulate Storyline 3*

Achievement Rate (%)	Category
85 – 100	Very effective
75 – 84	Effective
65 – 74	Less effective
55 – 64	Ineffective

Analysis of the effectiveness of interactive learning multimedia based on articulate storyline 3 based on learning activities while students use the application is carried out using the method described (Sudijono, 2011) as follows: $P = \frac{f}{N} \times 100\%$, with P = activity percentage, f = activity frequency, and N = total number of students. The criteria used according to (Nuraini et al., 2018) are as in Table 4 below:

Table 4. Criteria for the Success of Student Learning Activities Using Interactive Learning Multimedia Based on *Articulate Storyline 3*.

Score Range	Criteria
81% - 100%	Very active
61% - 80%	Active
41% - 60%	Moderately Active
21% - 40%	Less Active
0% - 20%	Not Active

RESULTS

Based on data analysis of validity, practicality, and effectiveness of interactive multimedia learning based on *articulate storyline 3*, and research and development procedures according to the APPED design model, the results are described as follows.

Preliminary Analysis and Research

Aspects of graduation competencies in the 2013 curriculum include aspects of attitudes, skills, and knowledge. The learning process uses a scientific approach (*scientific approach*). The interactive learning multimedia developed is adapted to the demands of the 2013 Curriculum.

Based on the basic competency syllabus that must be achieved starting from comparison, social arithmetic, lines and angles, triangles and quadrilaterals, as well as data presentation. The developed interactive learning multimedia covers basic competencies in social arithmetic material, with indicators that must be achieved, namely, students can learn gains, losses, profit percentages, and loss percentages.

The development of interactive learning multimedia based on *articulate storyline 3* is supported by adequate facilities in the form of a computer laboratory in which there are several computers such as *Acer*, *Lenovo*, *Dell*, and *Thinserver*. This supports the learning process with interactive multimedia

learning based on *articulate storyline 3*. In making interactive learning multimedia the preparation of the material uses the 2013 curriculum mathematics package book, the 2016 revision, and the 2017 revision.

Design

flowcharts and *screen designs* are made combined with *storyboards. Screen design* and *storyboards* were created using *Adobe Photoshop CS6 software.* Making *screen designs* and *storyboards* is used as a reference in producing interactive learning multimedia based on *articulate storyline 3.* A flow chart or *flowchart* of research and development of interactive learning multimedia based on *articulate storyline 3* on social arithmetic material as shown in Figure 2 below.

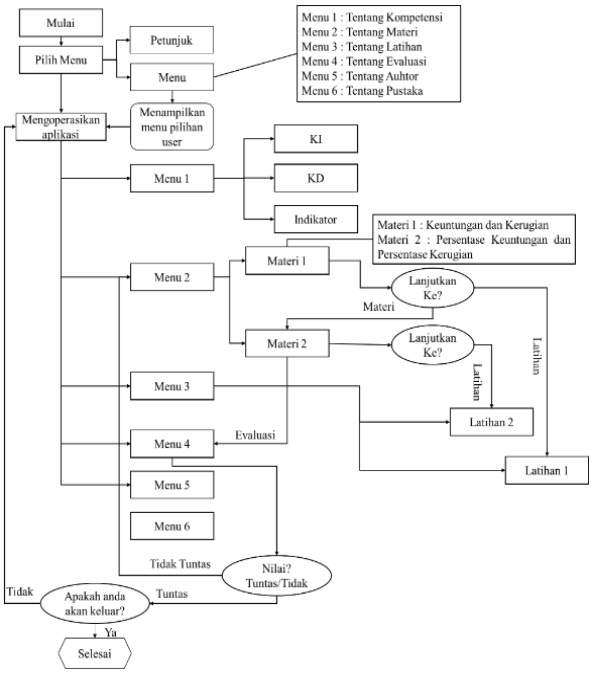

Figure 2. Interactive Learning Multimedia *Flowchart*

Production

At this stage, the production of interactive learning multimedia based on *articulate storyline 3 is carried out.* The production process refers to *the storyboard* that has been made. Broadly speaking, interactive learning multimedia consists of learning objectives, material summaries, exercises, and discussions, as well as supporting interactive multimedia learning.

1) Learning Goals
   The intended learning objectives are so that teachers and students are both aware of the content of this learning.
2) Summary
   Instructions for use contain instructions for using interactive learning multimedia based on an articulate storyline 3.
3) Exercise and Discussion

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Table 5. Exercises and Discussion on Interactive Learning Multimedia

Exercise	
Discussion	

4) Interactive Learning Multimedia Support

Table 6. Support for Interactive Learning Multimedia

Opening	
Main course	

Evaluation

1) *Ongoing* evaluation
   the ongoing evaluation was carried out by the researcher. The common mistakes that occur are wrong hyperlinks in interactive learning multimedia.
2) *Alpha Testing*

a) Validation Stage
   (1) Material Expert
   Based on the validation results by three material experts, the results are as follows:

Table 7. Material Expert Validation Results

Aspect	Score
Format	4,40
Fill	4,10
Average	4,25

From the results presented in Table 7, it was obtained an average of 4.25 from 3 validators with a very valid category.

(2) Linguist

Based on validation by linguists, the results are as follows:

Table 8. Linguist Validation Results

Aspect	Score
straightforward	4
Communicative	4
Dialogic and Interactive	3,5
Compatibility with Student Development	4
Compatibility with Language Rules	3,8
Average	3,9

From the results presented in Table 8, it was obtained an average of 3.9 from linguists with a very valid category.

(3) Media Expert

Based on the results of validation by media experts, the results are as follows:

Table 9. Media Expert Validation Results

Aspect	Score
Navigation	4.75
convenience	5
Writing	4,6
Appearance	4.70
Average	4.76

From the results presented in Table 9, it was obtained an average of 4.76 from media experts with a very valid category.

(4) Math teacher

Based on the validation results by the teacher, the results are as follows:

Table 10. Teacher Validation Results

Aspect	Score
Conformity with the rules of the Indonesian language	4,8
Effectiveness and directness	4,8
communicative	4
Suitability with student development	4
Serving technique	5
Presentation support	4,8
Presentation of Learning	5
Average	4,6

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From the results presented in Table 10, it was obtained an average of 4.6 from teachers in the very valid category.

b) Revision Stage

The revision stage is carried out to revise according to the suggestions given by the validator. The goal is that interactive learning multimedia based on articulate storyline 3 can be used for testing. All suggestions from material validators, media, language, and subject teachers were applied by improving interactive learning multimedia.

Dissemination

1) Trial Stage

After the interactive learning multimedia based on *articulate storyline 3* is declared valid, practicality and effectiveness tests are then carried out. This trial was conducted in class VII A of SMP Negeri 12 Merangin.

2) Deployment Stage

Dissemination of interactive learning multimedia by copying *interactive* learning multimedia files based on *articulate storyline 3* on the computers in the computer laboratory and inserting *the files onto a CD* to teachers in mathematics for class VII SMP Negeri 12 Merangin to use as learning media in the learning process. As for the students, the writer gave *the CDs* to the mathematics subject teacher so that they would be distributed to students when activities at school had started.

DISCUSSION

Product development in the form of interactive learning multimedia based on *articulate storyline 3*, has gone through several stages of product development to produce products that are feasible and can be used in learning. Broadly speaking, the stages of development that have been carried out are as follows:

Validity

Validation was carried out with five experts, namely material experts, linguists, and media experts. The results of the overall validation can be seen in Table 10 below.

Table 10. Results of Interactive Learning Multimedia Validation

Aspect	Score
Fill	4,15
Instructional	4.60
Appearance	4.76
Average	4.50

Based on the results of the overall validation, a validation value of 4.50 was obtained with a very valid category. This shows that the developed interactive multimedia learning based on *articulate storyline 3* is following the formulation of the problem given. This is in line with the opinion (Sugiyono, 2019) that a valid instrument means that the instrument can be used to measure what should be measured and can display what must be displayed. Thus it can be concluded that the resulting interactive learning multimedia is very valid and can be used in the learning process in class VII on social arithmetic material with profit, loss, profit percentage, and loss percentage as sub-materials.

Practicality

a. Practicality Questionnaire

The practicality of interactive learning multimedia based on *articulate storyline 3* is seen through a practicality questionnaire filled out by students. The results of the practicality questionnaire show 82.28% in the practical category. The achievement of this practicality value is because students

find it easy to interact with the media because of the clarity of the content, learning flow, and instructions for use. In addition, students' motivation in learning the media increases, so most students feel like using similar media in learning other material.

b. Student interview

The results of interviews with students show that interactive learning multimedia based on *articulate storyline 3* is already practical in terms of time, ease of use, and clarity of instructions for use. From practicality questionnaire data and interviews with students, it can be concluded that interactive learning multimedia based on *articulate storyline 3* is declared practical.

Effectiveness

a. Student learning outcomes

The learning outcomes test is carried out after the learning process using *flash-based interactive learning multimedia* is complete. The learning outcomes test was tested on *the articulate storyline of 3* students. Student learning outcomes can be seen in Table 11 below

Table 11. Student Final Test Results

Mark	N	%	Ket
≥ 75	18	81.8	complete
< 75	4	18,2	Not Completed

The results in Table 11 above show that the classical mastery after learning to use interactive multimedia learning based on *articulate storyline 3* is more than the classical KKM in the school. Student learning outcomes after learning to use interactive learning multimedia show that students get ≥ 75a lot of marks. (Salahuddin, 2004) revealed that one of the benefits of learning media is that it can improve the quality of learning outcomes so it can be concluded that interactive learning multimedia based on *articulate storyline 3* is categorized as effective so that it can be used as an alternative learning media on social arithmetic material.

b. Student Learning Activities

Student learning activities are observed during the learning process using interactive multimedia learning based on *articulate storyline 3*. Student learning activities are observed by one observer, whose job is to fill in the observation sheet provided.

The activities observed in *visual activities*, namely students reading interactive learning multimedia, obtained an average presentation of 97.74%, which means students are very active. In oral activities with student activities asking the teacher has an average percentage of 38.65% in the less active category, student activities asking friends have an average percentage of 47.74% which means students are quite active, and student activities expressing their opinions get an average - average percentage of 36.37% in the less active category. In *writing activities*, student activities working on evaluations on interactive learning multimedia obtain an average percentage of 97.74%, which means students are very active. Furthermore, *listening activities* in active student activities discussing in groups obtain an average presentation of 97.74% which means students are very active and student activities listening to teacher explanations have an average presentation of 97.74% which means students are very active. Whereas *motor activities* with student activities not taking actions that are irrelevant to learning obtained an average presentation of 97.74% which means students are very active, as well as in *mental activities* with student activities responding to teacher questions have an average percentage of 45.46% with quite an active category and student activity concluded that the material has an average percentage of 29.56% in the less active category.

Overall, the average percentage of student activity at the first meeting was 65.92%, while at the second meeting, it increased to 71.37%. So that the average student activity during learning using interactive learning multimedia based on *articulate storyline 3* is 68.65% with the active category. At the first meeting the students were still stiff, because learning to use interactive learning multimedia was still a new thing for them, while at the second meeting, students were used to and

Print ISSN: 2 088 -2 157 , Online ISSN: 2580-0779

more enthusiastic about learning using interactive learning multimedia. This is in line with the opinion of Fathurrohman and Sutikno (Kuswandi & Mafruhah, 2017) which revealed that one of the functions of using media in learning is to increase student activity or involvement in learning activities, therefore it can be concluded that students are more enthusiastic and eager to learn using interactive learning multimedia. , evidenced by the increase in the percentage of student learning activity from the first meeting to the second meeting.

Based on student learning outcomes and the results of observational data on student learning activities, it can be concluded that learning using interactive multimedia learning based on *articulate storyline 3* can be said to be effective. The use of the learning cycle learning model has a positive effect on learning outcomes and student activity. This is indicated by combining interactive learning multimedia using the *articulate storyline 3 programs.* Compared to previous studies, using the *articulate storyline 3 program* is a relatively new thing.

CONCLUSION

Based on the results of the study, interactive learning multimedia based on *articulate storyline 3* on social arithmetic material is appropriate for use as a learning medium. This is shown by the results of validity by material experts, linguists, and media experts in the valid category, the results of practicality from student response questionnaires and student interviews in the practical category, as well as the results of the effectiveness of learning outcomes and learning activities in the effective category.

ACKNOWLEDGEMENTS

On this occasion, the author would like to express his gratitude to all parties who have helped directly or indirectly in the completion of this product. Especially the principal of SMP Negeri 12 Merangin, a class VII mathematics teacher, validator/expert who has given his free time to be able to work together in product development so that it can be completed properly.

BIBLIOGRAPHY

Dr. Amin, SPMS, & Linda Yurike Susan Sumendap, MP (2022). *164 Contemporary Learning Models*. LPPM Publishing Center.

Dwi Surjono, H. (2017). *Multimedia Interactive Learning Concept and Development* (Part Edition). UNY Press.

Fitri, DY (2014). *Development of LKM in English for Mathematics Lectures at STKIP PGRI West Sumatra*. Proceeding of the 2014 Surya STKIP Mathematics, Science, and ICT Education National Seminar, 1–9.

January. (2010). *Learning Cycle Learning Model*. Materials Science and Engineering A, 16(6), 1–19.

Kadarwati, A., & Rulviana, V. (2020). *Integrated Learning*. Cv. Ae Media Graphics.

Kuswandi, I., & Mafruhah. (2017). *Teacher's Efforts in Increasing Learning Motivation of Mentally Disabled Students by Optimizing the Use of Existing Media in the School Environment at Saronggi Extraordinary Elementary School, Sumenep Regency*. Authentic Journal, 1(2), 30–42.

Maulyda, M. (2020). *NCTM-Based Mathematics Learning Paradigm*.

Munir. (2009). *Distance Learning based on Information and Communication Technology (ICT) [Distance Learning based on Information and Communication Technology (ICT)]*.

Nuraini, Fitriani, & Fadhilah, R. (2018). *The Relationship between Student Learning Activities and Learning Outcomes in Class X Chemistry Subject at SMA Negeri 5 Pontianak*. Ar-Razi Scientific Journal, 6(1), 30–39. https://doi.org/10.1017/CBO9781107415324.004

Purwanto, N. (2010). Teaching Evaluation Principles *and Techniques*. In T. Surjaman (Ed.), PT Remaja Rosdakarya.

Rahmawaty. (2013). *The Effectiveness of Using Student Worksheets (LKPD) in Improving Student Learning Outcomes in Geography Social Studies Subjects in Class VIII SMP Negeri 6 Pasangkayu*. UNTAD GEOFKIP E-Journal, 1–16.

Sudijono, A. (2011). *Introduction to Educational Statistics*. PT Raja Grafindo Persada.

Sugiyono. (2019). *Research and Development Methods* (SY Suryandari (ed.)). Alphabet.

Sumarmo, U. (2000). *Development of a mathematics learning model to improve high-level intellectual abilities of elementary school students: a research report on competitive grants for universities in the 2000/2001 budget*. Faculty of Mathematics and Natural Sciences Education, Indonesian University of Education.

 Print ISSN: 2 088 -2 157 , Online ISSN: 2580-0779