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The Development of Articulate Storyline-based Learning Media to Improve 5th Grade Students' Mathematical Representation Ability

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Abstract

This study aims to produce Articulate Storyline-based learning media on cubes and blocks nets material for fifth-grade elementary school students. This is Research and Development study. This study uses the ADDIE development procedure (Analysis, Design, Development, Implementation, Evaluation). The sample of this study was 26 fifth-grade students in an elementary school in Gunung Kidul, Yogyakarta. Expert judgment or validation is carried out by 2 media experts and 2 material experts to assess and revise the product. The method of data collection is a representation test, observation and questionnaires. The data analysis technique used content analysis and narrative analysis techniques. The result is a product of Articulate Storyline-based learning media on cubes and blocks nets material for fifth-grade elementary school students. The overall result of the trial shows good results, namely obtaining a decent category with details: (1) the material expert test got 3.8 or 76% good results, (2) the media expert test got 4.8 or 80% good results, (3) the results of the calculation of the n-gain score of 0.3877 which indicates an increase in students' mathematical representation abilities using articulate storyline-based learning media with moderate categories. So, it can be concluded that the Articulate Storyline-based learning media

is good to be used as learning media on cubes and blocks in improving the mathematical representation abilities of fifth-grade elementary school students.

Keywords: *learning media, articulate storyline, mathematical representation, elementary school students.*

Abstrak

Penelitian ini bertujuan untuk menghasilkan media pembelajaran berbasis *articulate storyline* materi jaring-jaring kubus dan balok pada siswa kelas V sekolah dasar. Penelitian ini merupakan penelitian pengembangan. Tahapan penelitian ini menggunakan prosedur pengembangan ADDIE (*Analysis, Design, Development, Implementation, Evaluation*). Sampel penelitian ini adalah 26 siswa kelas V di salah satu sekolah dasar di Gunung Kidul, Yogyakarta. Uji ahli atau validasi dilakukan oleh 2 orang ahli media dan 2 orang ahli materi untuk menilai produk awal serta merevisi produk awal sesuai saran ahli. Metode pengumpulan data penelitian ini dengan tes representasi, observasi, dan angket. Teknik analsis data menggunakan teknik analisis konten dan analisis naratif. Hasil penelitian ini berupa produk media pembelajaran berbasis *articulate storyline* pada materi jaring-jaring kubus dan balok kelas V sekolah dasar. Keseluruhan hasil uji coba menunjukkan hasil yang baik yaitu memperoleh kategori layak dengan rincian: (1) uji ahli materi mendapatkan hasil 3,8 atau 76 % layak, (2) uji ahli media mendapatkan hasil 4,8 atau 80 % layak, (3) hasil perhitungan skor n-gain sebesar 0,3877 yang menunjukkan terjadi peningkatan kemampuan representasi matematis siswa dengan menggunakan media pembelajaran berbasis articulate storyline dengan kategori sedang. Sehingga dapat disimpulkan bahwa media pembelajaran berbasis *articulate storyline* layak digunakan sebagai media pembelajaran materi jaring-jaring kubus dan balok dalam meningkatkan kemampuan representasi matematis siswa kelas V sekolah dasar.

Kata kunci: *media pembelajaran, articulate storyline, representasi matematis, siswa sekolah dasar.*

INTRODUCTION

Learning media is anything that can convey messages or information through various channels. It also can stimulate students' thoughts, feelings, and willingness so that they can encourage the creation of an active learning process to add new information to students which will lead to the achievement of learning objectives (Hamid, 2020). Learning media will make it easier for students to understand the material in the learning. One of the subjects that require media to make it easier for students to understand concrete concepts is mathematics.

Several abilities must be mastered by students in learning mathematics are; (1) problem solving, (2) reasoning and proof, (3) connection, (4) communication, and (5) representation (NCTM, 2000). One of the skills needed to solve problems in mathematics is the ability to represent something. Mathematical representation is an aid in understanding mathematical concepts and principles in depth for simplification of solving mathematical problems (Ramziah, 2016). Representations are useful for communicating mathematical ideas in

various ways, both in the form of writing, symbols, pictures, and real objects so that students can master in representation indicators to learn mathematics easier (Fauziyah, & Jupri, 2020). Thus, it can be concluded that representation is the ability to understand and explore concepts to solve a problem.

The effective mathematics learning is when the students can develop representational abilities to improve their understanding of concepts as a problem-solving tool (Leinwand, et.al., 2014). Students can achieve representational abilities by paying attention to several indicators: (1) using representations (verbal, symbolic, and visual) to model and interpret physical, social, and mathematical phenomena (2) creating and using representations (verbal, symbolic, and visual) to organize, communicate mathematical ideas (3) choosing, applying, and translating mathematical representations (verbal, symbolic, and visual) to solve the problems (Graciella & Suwangsih, 2016).

Representation is the focus on constructing students' knowledge and understanding of mathematical concepts. Students, who understand a good mathematical concept will be able to define, classify, give examples, and relate various concepts to apply and present a concept in various mathematical representations. But mathematical representation competence does not appear in learning. This exposure is reinforced by the findings in a study conducted by Restu et al. Based on observations made to third-grade elementary school students, it was found that the difficulties experienced by students in solving problems related to the ability to represent mathematical fractions, namely the indicators of making equations or mathematical models from other representations, and compiling stories that match a representation that has been presented (Restu et al., 2020). If this competency does not appear in learning, students' critical thinking skills will not be honed, considering that a child's daily life is about problem-solving.

Students' mathematical representation ability is needed in solving real-life problems, but students prefer to try previously memorized procedures rather than connecting between problems presented in mathematical representations (Givvin, et. al., 2011; Richland et al., 2012; Stigler, et al., 2010). Whereas in learning mathematics, it does not only teach memorization, but also mathematics refers to several semiotic systems to build knowledge: symbols, spoken language, and visual representations such as graphs and diagrams (Schleppegrell, 2007). In addition, students also need to be encouraged ini using multiple representations to provide fluency between verbal, symbolic, graphic, and numerical mathematical concepts (Thompson & Chappell, 2007). Diagrams as a model of semiotic

representation and communication is allow us to construct mathematical meaning (Alshwaikh, 2010).

Representations that are widely used in mathematics are highly correlated with success in mathematics education. The results of the study by Gagatsis and Shiakalli (2004) show the relationship between the effectiveness of interpreting in solving problems by articulating different representations; In addition, it also examines the relationship between student performance and the nature of the representations included in the task of interpreting the problem. The ability to move from one representation to another is associated with the effectiveness in solving problems. Representations such as formal notation and diagrams routinely appear in students' minds in learning mathematics (Perkins & Unger, 1994). The results also show that mathematical representation has a role as a mediator between students' beliefs and mathematical problem-solving abilities (Yuanita et al., 2018).

Based on the results of these studies, the ability of students' mathematical representation is very necessary to be developed in learning mathematics, including in elementary schools implementation. Teachers can take various ways through the innovations in learning mathematics in the elementary school. Digitization of learning can be an alternative solution to overcoming the problem of students' mathematical representation abilities. This is in line with the results of research (Williams-Pierce, 2019) which shows that the digital environment supports the potential for mathematical representation of students through mathematical games using digital devices. Therefore, teachers should be able to create a digital environment that can develop mathematical representation skills in elementary schools. In addition, efforts are needed to attract and increase the enthusiasm of students in participating in learning activities. The use of learning media needs to be done to support the learning process so that students can receive and understand the learning well, and their critical thinking will improve mathematical competence, especially mathematical representation abilities.

Learning media used by researchers to improve mathematical representation skills is an interactive learning media based on Articulate Storyline on nets of cubes and blocks material. Interactive multimedia is a combination of various media such as images, audio, and text simultaneously in one program and provides a reciprocal response for users to be able to carry out various learning activities. Articulate Storyline is software that is used as a communication tool or presentation media with templates that you can create yourself. In its operation, Articulate Storyline is quite easy to use because developers/users must arrange a sequence of competencies to be achieved, materials, questions, evaluations, games, and instructions for using media that are arranged in an attractive and easy-to-understand

appearance so that the media created comes through a series of careful processes (Mumtahana et al., 2020).

Articulate Storyline is an academically designed medium or tool to develop interactive learning that works on any device (Francia et al., 2020). Articulate storylines allow teachers to create interactive learning videos and scenarios. Teachers can post feedback on student answers and can record or upload audio for questions to students. In addition, teachers can create triggers to jump to different slides depending on student responses. Videos (screencasts shot in a storyline, uploaded videos, or streaming videos) can be embedded on any slide. The storyline looks and feels like PowerPoint, which makes it easy for beginners to get started (Baker, 2016). The articulate storyline is one of the newest e-Learning application software as a powerful tool that allows content creators to create professional-level interactive tutorials quickly and effectively. Storylines provide a myriad of features, including screenshots, button exploration interactions, and the ability to seamlessly embed audio and video (See & Teetor, 2014). In addition, an articulate storyline is also software or software that has a function as a medium in interactive learning. This software can be used in presenting information according to its purpose (Hadza et al., 2020).

Articulate Storyline interactive multimedia has several advantages, namely this application has the feature of adding characters, various kinds of quizzes, question forms, links and URL buttons, layers that separate objects from one another, and triggers that function to direct to the desired place, and can be published (saved) in various formats such as: LMS, html5, Articulate Storyline online, CD, and Word. Thus, this media will look more comprehensive, interactive, and effective. Articulate Storyline-based interactive media can also be useful as a medium to add and expand knowledge in the classroom that provides accurate information so that it can help students think and develop further. In addition, the media can include a detailed explanation of the material for spatial networks so that not only critical thinking skills are improved but also mathematical representation skills. Mathematical representations will support and facilitate student understanding, if given instructions that support understanding representations before they are used to explain mathematical concepts (Rahmadian et al., 2019). Instructions, materials, and sample images regarding the material can be delivered through the Articulate Storyline learning media so that learning materials can be conveyed in more detail, clearly, and completely. Thus, it will be easier for children to learn so students' mathematical representation abilities will also increase. Mathematical representation ability has several benefits including: (1) understanding the mathematical concepts studied and their relationships; (2) communicating students' mathematical ideas; (3)

to better introducing the relationship between mathematical concepts; (4) or applying mathematics to realistic mathematical problems through modeling (Syafri, 2017).

The choice of learning media based on Articulate Storyline is of course based on the characteristics of the problem, assumptions and the results of studies related to increasing students' mathematical representation abilities. Research that has been carried out by (Asmara, 2014; Susanti et al., 2019) results that students' mathematical representation abilities can be improved through the use of problem-based learning models. Furthermore, research (Yulianawati & Fajar, 2020) also proves that students' mathematical representation abilities can be improved through problem-based learning of Krulik and Rudnick strategies. Therefore, it can be assumed that the improvement of students' mathematical representation skills can be pursued in the process of problem-solving activities related to mathematics. In addition, research results (Utami et al., 2019) show that applying multiple representation learning models is effective in improving students' mathematical representation abilities, while research results (Susilawati, 2020) prove that efforts to improve students' mathematical representation skills can be done through the use of Android Challenge-Based Learning.

In contrast to previous studies, this research focuses on developing learning media that can help students improve the mathematical representation skills of elementary school students. The development of this learning media is based on Articulate Storyline which can train students in solving problems in everyday life related to mathematical concepts. The development of this media is designed as attractive as possible through problem solving activities using interactive multimedia, so that it is expected to improve the mathematical representation ability of elementary school students.

METHODS

This study was carried out to develop mathematics learning media on the material of nets of cubes and blocks using Articulate Storyline. The method used in this study is the Research and Development (R&D) method. The R&D method is research that is used to produce certain products and test their effectiveness of these products. This research model is the ADDIE (Analysis, Design, Development, Implementation, Evaluation) development model, which is a development consisting of five stages. The research stages in the ADDIE development carried out adopted from Branch (2009), namely analysis, design, development, implementation, and evaluation.

Analysis in the early stages, namely conducting interviews and observations to analyze student learning needs including identifying the characteristics of the targets and resources

needed, as well as mathematical representation skills related to the cube and block nets material that is contained in the Articulate Storyline-based learning media. Design is done by selecting fonts, teaching aids (cube nets and blocks), choosing colors, images, materials, sample questions, music, animation, and background display. But before that, the developer compiled learning indicators and developed assessment techniques first.

Development carried out by making learning media based on Articulate Storyline on the material of cube and block nets. All components that have been prepared at the design stage, are arranged, or produced into learning media on the material of cube and block nets. After the Articulate Storyline-based learning media on cube and block nets material was completed, then the validity was tested by 1 media expert validator and 1 material expert. The activities carried out at the Development stage are producing mathematics learning media for fifth-grade students on nets of cubes and blocks material. The process of making this learning media uses an application installed on a PC/Laptop called Articulate Storyline. The stages in making Articulate Storyline-based learning media include:

a. The First Stage

   At this stage, the developer prepares a special template along with supporting images that will be displayed on the slide. Supporting images prepared include cube nets, block nets, cube space construction, block space construction, slide background, and developer profile photo. In addition, the developer also prepared material on the characteristics of cubes and blocks, questions for quizzes, and questions for games.

b. The Second Stage

   At this stage, the researcher began to develop the contents of the slides in the form of materials, quizzes, and games. These three types of slides are developed in the same way, namely: (1) choosing a background that matches the content of the slide (2) filling it with materials, commands, questions or pictures (3) designing special slides for quizzes and various games (4) provide triggers for command buttons, slides, questions, images, and other slide contents (5) provide transitions or animations for each component needed, one of which is the transition from to the next slide.

c. The Third Stage

   At this stage, the developer does the finishing by checking again whether there are parts that are lacking, odd, and wrong. Developers also test the media by doing quizzes and games to ensure that the media developed is correct.

At the implementation stage, the revised learning media is implemented in real situations in the classroom. During implementation, the learning media that have been

developed are applied to actual conditions. At the evaluation stage, what is done is media assessment by material expert validators and media experts in their fields to analyze the strengths and weaknesses. If some deficiencies are found, the researcher will immediately revise them.

This research was conducted on fifth-grade students in an elementary school in Gunungkidul, Yogyakarta. This study involved 26 students, namely 13 male students and 13 female students. The data collection technique used in this study was using a questionnaire with a questionnaire sheet instrument to assess the feasibility of the media and student responses to the media created. The data analysis technique used content analysis and narrative analysis techniques. Then, to assess students' representational and cognitive abilities, they used a written test with a test sheet instrument in the form of a pretest and posttest. The feasibility test of learning media based on Articulate Storyline on cube and block nets is validated, the instrument used is a validation sheet. The media eligibility criteria refer to the criteria adopted from Arikunto & Jabbar (2009), namely as follows.

Table 1. Media Eligibility Criteria

Value in Percent (%)	Eligibility Category
<21%	Very Poor
21 – 40 %	Poor
41 – 60 %	Acceptable
61 – 80 %	Good
81 – 100 %	Very Good

After the feasibility test, the media product was tested on research subjects through a series of activities, such as pretest, implementation, and posttest regarding the mathematical representation ability of elementary school students. The results of the pretest and posttest were then calculated using the N-Gain test formula to obtain a normalized score regarding the increase in students' mathematical representation. The level of gain of the normalized score is categorized into three categories (Hake, 1998), namely:

Table 2. Category Distribution of N Gain Score

Value (G)	Classification
$N\text{-}Gain \geq 0{,}7$	High
$0{,}3 \leq N\text{-}Gain \leq 0{,}7$	Middle
$N\text{-}Gain < 0{,}3$	Low

Media can be said to be effective in learning if the average normalized gain is at least in the medium category or more than 0.30. More details can be seen in the following table:

Table 3. Effectiveness Category in N-Gain. Test Assessment

Percentage	Category
N-Gain > 0,3	Effective
N-Gain ≤ > 0,3	Ineffective

RESULTS AND DISCUSSION

Product Design that has been Developed

Articulate Storyline-Based Learning Media contains material on the characteristics of cubes and blocks, quizzes, and games that support the content of the material. This media is designed to make learning media that is interactive, educative, acceptable, of good quality, and has an attractive appearance so that students become enthusiastic about learning and create fun learning. This Articulate Storyline-Based Learning Media is designed practically so that students can learn anywhere and anytime. The use of Articulate Storyline media will reach all the characteristics of student learning because it can produce visual and audiovisual media. In addition, this media can be operated by the students themselves so that they can provide a better learning experience. The advantage of this application is that it has features of adding characters, various kinds of quizzes, question forms, links, and URL buttons, layers that separate objects from one another, triggers that function to direct to the desired place, and can be saved in various formats such as: LMS, html5, Articulate Storyline online, CD, and Word. The use of Articulate Storyline-based learning media can overcome the problem of difficulty understanding the material. At this design stage, the researcher designs media content which consists of:

a. Introductory Page Display

The first page is designed as attractive as possible with the addition of the character of Mrs. Sudiarti as the teacher for class V at SDN Banaran 1 Playen. On this page is also presented the title or material that will be studied by students. After that, students can click the arrow to go to the next slide.

Figure 1. Introductory Page Display

b. Material Display

In this section, the material is presented on the characteristics of cubes and blocks along with examples of their nets. Each slide is equipped with next, previous, home and exit buttons, each of which is explained on the slide of the button function.

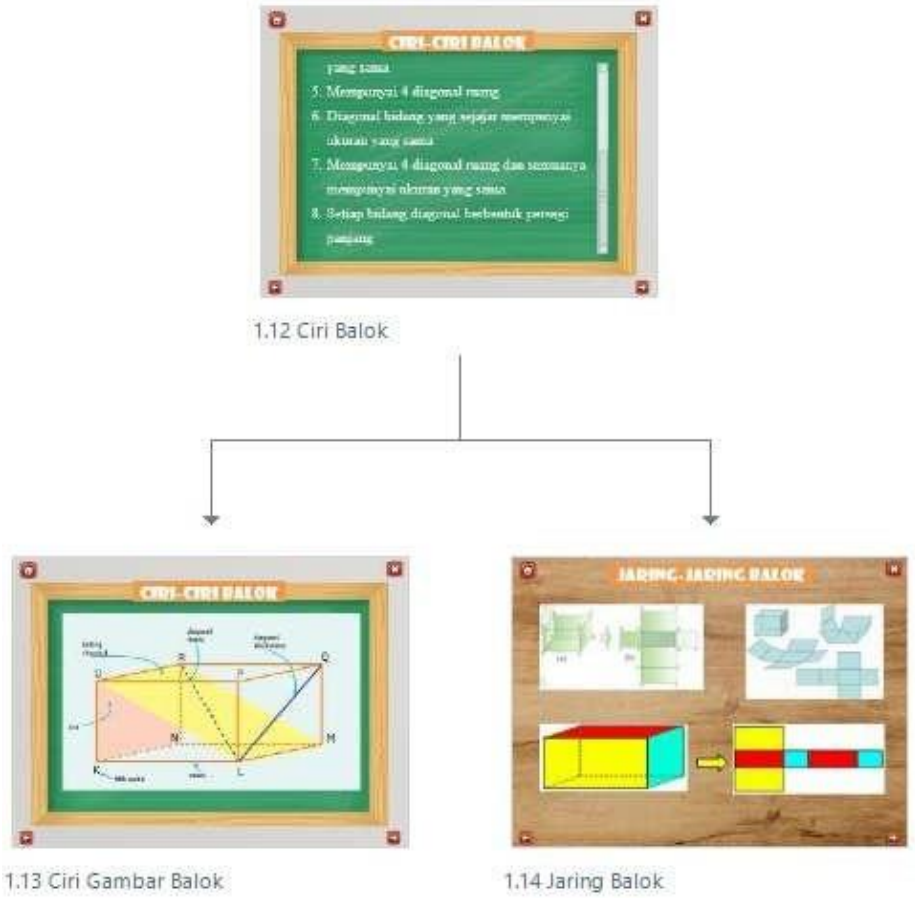

Figure 2. Material Display

c. Quiz Display

In this section there is an introductory quiz display that can be clicked on the Start button. Next, students will start taking quizzes on the material that has been studied. There are 3 quizzes in the form of choices, students can choose the right answer in the small circle next to the answer. After completing all three quizzes, students can see the results on the final slide of the quiz.

1.15 Quiz

1.16 Soal 1

1.19 Results Slide

Figure 3. Quiz Display

d. Games Display

To understand the material better and to make students enthusiastic about participating in learning, several types of games are presented regarding the material that has been studied. These games include pairing, matching, and sorting. Each type of game is given operating instructions at the top so as not to confuse students.

Figure 4. Games Display

Product Validation Results

At this stage, the activity carried out is the assessment of the Articulate Storyline learning media by material expert validators and media experts to analyze the advantages and disadvantages which if found some shortcomings will be immediately revised by the developer. Based on the calculation results of the validators, there is an average for each expert. The results of the validation from various experts as well as the results of the pre-test and post-test are described in the tables below.

Table 4. Validation Result from Experts

Validator	Total Score	Mean	Percentage	Description
Material Expert	38	3,8	76%	Good
Media Expert	48	4,8	80%	Good

Based on table 4, the results of the validation of learning media based on Articulate Storyline material for nets of cubes and blocks indicate the category is good to use. There is an average for each expert, namely material experts of 3.8 and media experts of 4.8.

Product Implementation Results

At this stage, the revised Articulate Storyline learning media is implemented in real situations in the classroom. During implementation, the media designs, methods, and models that have been developed are developed in actual conditions. For teachers who use this media, it is necessary to pay attention to the steps of using the media appropriately and accordingly so that they can achieve the learning objectives set. The learning steps that teachers can take in using this media are:

a. Introduction

The activity at this stage is to prepare a laptop/PC as the main tool for using Articulate Storyline learning media. In addition, the teacher and the developer provide a brief description of the content and learning objectives to be achieved. Next, the teacher conducted a pretest for the students to determine the students' initial ability to understand the material for nets of cubes and blocks.

b. Core activities

1) The activity in this learning step is the presentation of material in the media Articulate Storyline.
2) Teachers can start learning systematically based on the order of the media.
3) The teacher explains the material as stated on the Articulate Storyline media.
4) The teacher invites students to take quizzes and discuss the content of the quiz and check the answers together on the slides contained in the Articulate Storyline media.
5) The teacher opens a question-and-answer session.
6) The teacher re-explains and provides conclusions about the material that has been discussed.
7) The teacher asks the students to work on the games together.
8) The teacher evaluates learning by conducting a post-test to determine the extent to which students understand the material that has been studied.

c. Closing

Teachers and developers conclude the whole learning process and are also expected to provide feedback and follow-up on this learning such as asking students to try doing quizzes and games again.

After product implementation, the media was then tested on students and teachers. Implementation trials were carried out to determine responses, improvements, and implementation of learning by using learning media based on Articulate Storyline material for nets of cubes and blocks.

The results of the pre-test and post-test were calculated by statistical tests using the help of SPSS 23 for windows, the results of the N-gain score test calculation for the experimental class (Articulate Storyline-based learning media) are shown in table 5 below:

Table 5. Calculation Results of N-Gain Score Analysis

	N	Minimum	Maximum	Mean	Std. Deviation
Ngain_score	23	-4.00	1.00	.3877	1.01988
Ngain_Persen	23	-400.00	100.00	38.7681	101.98809
Valid N (listwise)	23				

Based on the data above shows that the average value of the N-gain score is 0.3877. The score is categorized based on the Hake category is included in the "medium" category. So, it can be concluded that the "Effective" Articulate Storyline-based learning media is applied in learning as an effort to improve students' mathematical representation abilities.

Mathematical representations can not only be seen in visual representations in the form of graphic diagrams and pictures but can be seen through equations or mathematical expressions and written words or text such as writing interpretations of a representation, writing steps for solving problems, answering questions with words or written text (Deswantari et al, 2020). The improvement of students' representation ability can be seen through the results of the pre-test and post-test. In the pretest and posttest questions, there are questions regarding the steps to solve problems in making nets of cubes and blocks, making nets of cubes and blocks, as well as several questions related to nets of cubes and blocks. Before using the Articulate Storyline-based learning media, the students' mathematical representation was low at 2.96. This can be seen through the results of the students' pretest scores. After implementing the use of Articulate Storyline-based learning media for cube and block nets, it can be seen in the table that there was an increase after using Articulate Storyline-based learning media for cube and block nets. After using the learning media, the average posttest of students increased to 3.96. There was an increase in representation ability of 1.0 after using media based on Articulate Storyline with cube and block nets.

From the results of the n-gain test regarding increasing student representation using articulate storyline-based learning media, it can be seen that using articulate storyline-based learning media is effective in improving students' abilities regarding student representation in

solving mathematical problems with various student characteristics, which is in line with research results (Flood, 2016) showing that through the symbolic representation of mathematical ideas, communication can occur which stands to break cultural barriers and unite all people using one common language. Of course, the development of this mathematical representation is carried out through the development of a digital environment that supports the potential of students' mathematical representations through mathematical games using digital devices (Williams-Pierce, 2019).

The development of a digital environment is a keyword in the development of student representation with various characteristics; of course, articulate storyline-based learning media is an alternative in developing students' digital environments to improve students' representational abilities in learning mathematics. This digital environment that uses articulate storyline-based learning media is effective because students can interact in multiple directions, both with teachers and with digital learning resources. This is in line with research results (Franklin et al., 2021) which show that the use of articulate storylines is beneficial for its interactivity and strong integration with digital learning. In addition, articulate storylines are also able to help create interesting e-learning with very simple features (Dzandu & Tang, 2015).

The usefulness of articulate storyline-based learning media in digital learning is certainly a learning reinforcement that can develop various student potentials. Efforts to help assist the cognitive development of mathematics in the selection and the analysis of students require more innovative interaction techniques and designs in mathematics learning (Sedig & Sumner, 2006). The choice of flexible strategies and flexible representations in learning mathematics is necessary, and flexibility in the selection of representations to complete mathematical tasks (Nistal et al., 2009). One of the Articulate Storylines as an e-learning tool supports the creation of distance asynchronous learning that allows teachers and students to conduct direct question and answer processes in the learning management system (Stickney, et al., 2021).

Based on the development and implementation process in this research, articulate storyline-based learning media is very effective in helping students to improve their quality of the learning process and students mathematical representation abilities. The development of articulate storyline media is very important for teachers to always do in developing digital learning. Of course, the purpose of digital development through articulate storyline-based learning media is so important. It can attract students' attention and the material can be more clearly understood by students. This is in line with the results of research by Mu'arifin et al.

(2022) which shows that the development of learning media with articulate storylines is stated to have clarity, attractiveness, suitability, accuracy, and feasibility for students.

When implementing mathematics learning using articulate storyline-based learning media in this series of research, it shows that students are motivated in carrying out varied learning interactions using media that attract students' attention to learning mathematics. This is in line with the results of research (Regan et al., 2018) which shows that through the use of articulate storylines, students seem immersed in various articulate storyline-based interactive learning activities, where they have to click, point, drag, drop, and explore to continue. Gamification-based learning by following under the characteristics of elementary school students. Throughout the design and development of online learning, the main need is sophisticated ICT tools (Engelbertink et al., 2020). Therefore, in learning mathematics in the elementary school, sophisticated technology is needed to design creative and innovative learning in developing the abilities of elementary school students. The articulate storyline can be an alternative in developing the abilities of elementary school students in digital learning or online learning according to the characteristics of students.

CONCLUSION

The results of the validation by material experts get a score of 3.8 out of a maximum score of 5 so it can be stated that the product developed is in the "good" category of feasibility. The results of the validation by media experts get a value of 4.8 which means this media has a "high" level of validity and quality. Therefore, the articulate storyline-based learning media developed by the researcher was declared suitable for use on cube and block nets. In addition, based on the n-gain test with a score of 0.3877, it shows that the "Effective" Articulate Storyline-based learning media is applied in learning as an effort to improve the mathematical representation ability of elementary school students. So that the Articulate Storyline-based learning media can be used as an alternative that can be implemented by teachers in developing innovative media and can improve the mathematical representation skills of elementary school students.

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