

Interactive Media Development Using Articulate Storyline-Based Instructional Games for Teaching Fractions

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Keywords:	Abstract
<p><i>elementary school;</i></p> <p><i>fractions;</i></p> <p><i>interactive media</i></p>	<p><i>This research and development were carried out to produce valid and engaging interactive fractional learning media products using Articulate Storyline-based instructional games. This study used the type of research and development (R&D) using the ADDIE model. The research subjects were the fifth-grader of State Elementary School 5 Saptorenggo Malang Regency. The techniques used in this study were validation questionnaires, observation, and interviews. Material experts, media experts, and teachers conducted a validity test to achieve a valid category result. The attractiveness test obtained a very high score and reached the very attractive category. The use of product development can improve student learning outcomes and provide an understanding of fractional material that is known from the value they get when doing practice questions and getting an average score above the Minimum Completeness Criteria. Thus, it can be said that this interactive media falls under the category of being appropriate for use in the learning process and being both valid and interesting. This research employed an Articulate Storyline-based learning game that covers the subject of mathematical fractions.</i></p>

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INTRODUCTION

Background

Education is a process to create the next generation of the nation in Indonesia. Education is a conscious and planned effort to realise the atmosphere of learning and the process of learning activities so that students can learn by actively developing their potential to have religious-spiritual strength, self-control, personality, intelligence, noble morals, as well as the necessary skills themselves, society, nation and state (Indonesian National Ministry of Education, 2003). In the event of a covid-19 pandemic in Indonesia, education must continue to run in accordance with the purpose of education with distance learning activities between teachers, students and parents conducted online or online. In the current conditions in Indonesia, learning media is needed to meet the needs of learning at home.

Learning media is a tool used to help deliver subject matter and improve the quality of learning (Inayah et al., 2021). Learning media are all forms of physical equipment that include original objects, printed materials, visuals, audio, audiovisuals, multimedia, and the web that are designed in a planned way to convey information containing learning messages so that students can construct knowledge effectively and build interactions that are designed and developed deliberately to fit the needs of students and learning goals (Yaumi, 2018). According to Murdiyani (2018), the objectives of learning mathematics at the elementary school level from grades 1 to 6 are math learning activities to help students gain fundamental knowledge and skills regarding number numbers and geometric forms, assist students in the development of critical and logical thinking skills and can express themselves in everyday life, help students find pleasure in mathematical activities, and appreciate the value of mathematics and encourage students to think. To use mathematics in everyday life in their learning activities. One of the subjects that are considered difficult by students is mathematics. According to Pradana (2016), mathematics is a subject that is still regarded as difficult for students to understand. In addition to being considered difficult, other factors also affect when understanding math lessons (Nurjanah et al., 2021). One of these factors is that students feel afraid of math lessons. According to Yuniawatika (2018), most students do not like and even hate math as they think math is boring and scary. With fear and boredom, students will be hampered the next time even though the previous material students have found it challenging to understand the initial concept. The material that is considered difficult by students in math subjects is fractional. Suaryani et al. (2016) reveal that students' ability to complete calculation operations, especially in fractional materials, still needs improvement because it is classified as low. The medium of learning fractional material can certainly stimulate students to continue learning mathematics without feeling bored. According to Nuraini et al. (2017), fractions include fundamental concepts. They are prerequisite materials for studying and understanding the material in mathematics, so assigning students to fractions, especially the operation of fraction counting, becomes a must.

The Articulate Storyline is a learning media that will improve school learning quality. Computers can be utilised for learning, also called Computer-Based Instruction (CBI), which has several methods. One of the methods of CBI is the instructional games model. Instructional games aim to provide a student learning experience through educational forms of games and challenges that give a pleasant impression to students. An instructional game is a teaching strategy that uses games created to grab students' attention and keep them engaged as the medium evolves, challenging them to learn. In the developed instructional media, a game is interlaced with the benefits of interactive media created with Articulate Storyline.

Problem of Study

Learning media are required to meet learning needs at home under the conditions of Covid-19 restrictions in Indonesia. Mathematics is one of the subjects that call for learning resource alternatives. According to Pradana (2016), Mathematics is one subject that is still considered difficult for students to understand. One of them is in mathematical content, especially fractional matter. Interviews were conducted with the fifth-grade teacher at Saptorenggo State Elementary School 5 Malang Regency. The results of interviews with the fifth-grade teachers related to problems in math learning and the media used showed that they had difficulty teaching material about fractions. These issues must be resolved immediately to prevent students from experiencing further difficulties when learning fractional concepts at the higher class level. Teachers must use media that is easy for students to understand. Making educational media for students will significantly help them stay interested in their learning activities and prevent boredom while they are learning.

State of the Art

The success of previous research is proof of the effectiveness of learning media using Articulate Storyline. Research relevant to this problem is the first research Nugraheni (2017) demonstrates that using Articulate Storyline media can increase students' learning interest in the learning process and fall into the category worthy of application. In line with research by Irfan (2014), implementing the CBI instructional games model on interactive learning can increase students' motivation to learn. Rafmana et al. (2018) also stated that interactive multimedia based on the Articulate Storyline increase students' learning motivation. The second is the results of research by Salam (2017), saying that the learning medium can be effective in the learning process because there are differences in students' learning outcomes after and before using the media. Fitriani (2015) states that CBI games are also effective and efficient when used in teaching and learning activities because this medium can make the learning atmosphere more fun and the material easy for students to understand. Sapitri et al. (2020) stated that interactive media based on Articulate Storyline applications are effectively used in learning activities. In line with Purnama & Asto's (2014) research, interactive media using Articulate Storyline can be used as a support for subjects. Third, the medium of learning can overcome students' difficulties in learning in research (Pratama, 2019). Fourth, research by Arwanda et al. (2020) states that the response of teachers and students is outstanding in the use of media. In line with Yumini & Rakhmawati (2015), the results of the student's responses to interactive learning media received good answers. The previous research has similarities, namely using the Articulate Storyline application, and previous research is not game-based.

Gap Study & Objective

This research and the problems during the learning process can provide an idea to develop learning media adapted to technological developments according to the current covid-19 conditions. Using Articulate Storyline learning media based on instructional games will be a solution to increase students' learning interest in fractional materials during the distance learning process and make fractional material more manageable for students to understand. Articulate Storyline learning media based on instructional games can be utilised wherever students are as a learning medium that involves them. Students will participate actively in learning, from presenting content and playing games to working on fascinating and engaging challenges.

METHOD

Type and Design

The research method used to develop an articulate media storyline based on instructional games class V fractional material was the R & D (Research and Development) method using the ADDIE research model. ADDIE development model consists of several interrelated stages: analysis, design, development, implementation, and evaluation. The following (Figure 1) is the stage of the ADDIE model.

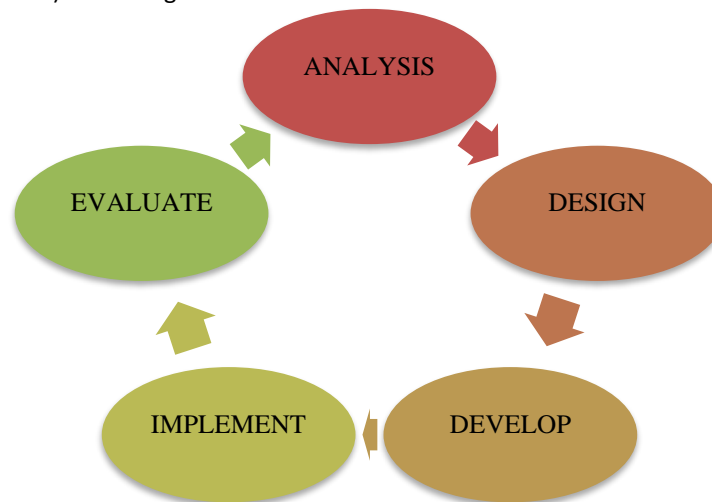


Figure 1: ADDIE Stage Model

(Source: Rayanto, 2020)

The analysis stage is the stage that is done before planning the product in the form of learning media devices (Bungin, 2010). Needs analysis aims to bring up and establish the fundamental problems faced in elementary students' learning in fifth grade on fractional material. The process of student analysis involves speaking with classroom teachers in order to learn more about the students' characteristics and teaching styles. The generated product was assessed to ensure it was appropriate for students based on the data gathered. Using outlines of the teaching materials that correspond to the relevant curriculum, material analysis is used to pinpoint the learning content. Researchers used Articulate Storyline to plan and create a media content outline that includes elements from interactive learning media. The outline of media content is then put into a flowchart and manuscript to help with the development process later.

The development stage involved creating products based on a design validated by material validators, media, and fifth-grade teachers. The results of the assessments, suggestions and inputs from validators were then used as the basis for revision and evaluation activities in the form of product improvements. The implementation phase involves testing products developed for research subjects. This evaluation stage is carried out to evaluate the media implemented to increase students' learning interest in fractional mathematical content using the developed interactive learning media using Articulate Storyline. Student learning interest is measured by analysing the results of problem training from students in interactive media using Articulate Storyline-based instructional games. This interactive medium's suitability for use in the learning process can be determined after the evaluation stage.

Data and Data Sources

This type of data used in research and development is qualitative data collected from observations and interviews with teachers and advice and input by expert validators of materials, media, and teachers. While quantitative data comes from the percentage results of needs analysis instruments, validation score results by experts and student response questionnaires. The data sources for this interactive media development research were obtained from experts.

a. Material expert

In the material feasibility test, the person who tests the feasibility of the content of the developed learning media is an expert in the field of Mathematics. Material experts will provide criticism, suggestions and comments on the material outlined in interactive learning media using an Articulate Storyline based on instructional games.

b. Media expert

Media design experts in interactive media design will correct the learning media for fractional material based on interactive media and articulate a storyline based on instructional games.

c. User (Teacher)

Teachers are educational practitioners in schools. Class teachers can provide suggestions regarding the product being developed. In this study, the fifth-grade teacher at State Elementary School 5 Saptorenggo Malang Regency.

d. Student

In implementing student trials, there are several criteria used as a reference. Students' application is based on considerations, namely elementary school students who are still studying or have studied fractions. The students who took part in this research trial were all fifth-grade students at State Elementary School 5 Saptorenggo Malang Regency. Meanwhile, the use trial was attended by all fifth-grade students at State Elementary School 5 Saptorenggo and the teacher.

Data collection technique

An instrument is used to collect data related to the research and development of products. This development research instrument contains observation sheets, interviews, and questionnaires. The data collected at the beginning of this development research activity include the results of the analysis of students' needs, materials, and characteristics. Data collection techniques through interviews with the fifth grade teachers, observations on the online learning process, and the provision of needs analysis questionnaires. The Guttman scale will provide questionnaires containing needs analysis data to students. After collecting initial data, the following data collection is data validation of interactive media development products. Data collection techniques for product validation using a validation questionnaire. Questionnaires containing validation were given to material experts, media experts, teachers as field practitioners, and student responses to interactive media using Articulate Storyline-based instructional games.

Data analysis

In this study, data analysis techniques are carried out qualitatively and quantitatively. Data using qualitative methods are from advice and input from material experts, media experts, and teachers. While the results of filling the questionnaire by material experts, media experts, teachers, and student responses to interactive media using Articulate Storyline-based instructional games are analysed using quantitative techniques.

This data analysis technique was carried out by distributing several questionnaires from experts. This validation questionnaire is aimed at material experts, media experts, and teachers whose function is to determine the validity of interactive media using Articulate

Storyline-based instructional games. In this study, the data analysis technique used a Likert scale. The validation questionnaire ranges from 1 to 4, used as a benchmark for achieving the product's criteria. Table 1 shows the range of scores using a Likert scale.

Table 1. Table Likert scale

Evaluation	Score
VG (Very Good)	4
G (Good)	3
E (Enough)	2
NE (Not Enough)	1

(Source: Sugiyono,2013)

Obtaining scores from material experts, media experts, and teachers can be converted into percentage form by referring to the formula from Akbar (2015) as follows:

$$Vah : \frac{Tse}{Tsh} \times 100\%$$

Description :

Vah = expert validation

Tse = Total empirical score achieved

Tsh = Total expected empirical score

The score of the validation results from material experts, media experts, and teachers that have been converted into percentage form can be interpreted as follows:

Table 2. Categorisation Criteria for Validation Results

Achievement Level (%)	Category	Test Decision
85.01 – 100%	Very Valid	Can be used without revision
70.01 – 85%	Quite Valid	Usable, but needs revision
50.01 – 70%	Not Valid	Can be used with major revisions
01.00 – 50%	Invalid	Cannot be used

(Source: Akbar, 2015)

Based on these criteria, the developed games can be valid or used if the percentage achieved is above 70%. Meanwhile, suppose the percentage is less than 70%. In that case, the interactive instructional game based on the Articulate Storyline must be heavily revised following the suggestions and inputs given by material experts, media experts, and teachers.

RESULT

Observing the behaviour of students

By utilising the images in Figures 2, 3, and 4, the interactive media display was made as appealing as possible to prevent students from becoming bored.



Figure 2: Product Home Page



Figure 3: Product Display Menu



Figure 4: Product Start Menu

The material also consists of fractional material, games, problem training and video explanation material, as shown in figures 5, 6, 7 and 8 below.



Figure 5: Material Menu



Figure 6: Game Content View

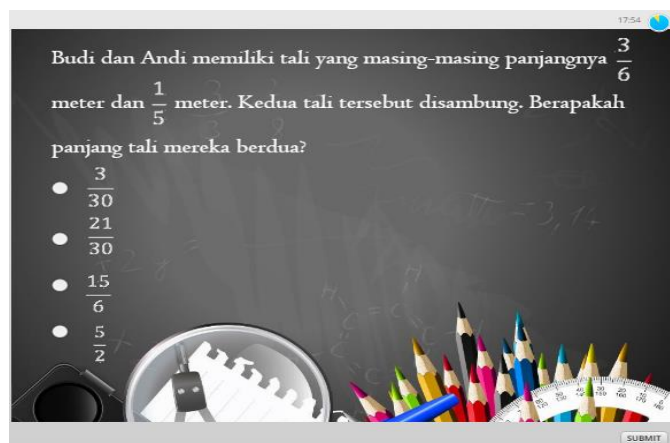


Figure 7: Quiz



Figure 8: Video Menu View

The first validation activity was on validation by material experts assessing aspects (1) of the material, (2) feedback, and (3) material relevance. Validation results by material experts obtained results of 89.81%, which, if interpreted in the categorisation criteria referred to Akbar (2015), it was known that interactive media using Articulate Storyline-based instructional games fractional material class V Elementary School was entered at an interval achievement rate of 85.01% - 100% which falls into the category of very valid meaning interactive media using Articulate Storyline based instructional games can be used without revision. Then, validation was carried out on expert media aspects assessed by media expert validators, namely (1) media design, (2) display, and (3) media eligibility. Obtained results of 86.9%, which fall into the category was very valid, meaning that the product in the form of interactive media Articulate Storyline based on instructional games could be used without revision. Then, the product was validated by the fifth-grade teacher of State Elementary School 5 Saptorenggo Malang. Aspects assessed by the user include aspects (1) the content of the product; (2) the presentation of the product; and (3) the use of the product. The result of 86.8%, which falls into the category, was very valid. This means that this interactive media was very valid and could be used without revision. For the results of the validation are presented in table 3 below.

Table 3. Validation Result

Validator	Validation Value	Validation Value Average	Category
Material Expert	89,81%		
Media Expert	86,9%	87,83%	Very Valid
Teacher	86,8%		

After doing validation activities, then conducted trial activities for the fifth-grade students. Trial activities to measure the efficacy of interactive media products were carried out twice, namely small-scale trials and usage trials. Small-scale trial activities were conducted with five students. They produced a 94.28% attractiveness score which was interpreted according to the categorisation referred from Arikunto (2010), entering at intervals of $76 \leq P \leq 100$, which was otherwise very attractive and can be used without revision. Furthermore, the results of the usage trial conducted with 21 students got results of 100% with very interesting categories and can be used without revision.

In problem training, student achievement results also vary, with the average problem training work value of 92 in small-scale trial activities and the average problem training work

of 90.47 in usage trials. This showed that the average value reached the Minimum Completeness Criteria score of 75. Based on the exposure, it could be known from the development of Articulate Storyline-based interactive media for teaching fractions had valid and exciting values to be used in learning activities to teach math subjects on fractional material in accordance with the results of assessments by material expert validators, media experts, teachers or users, and student responses.

DISCUSSION

The development product produces interactive media fractional material for the fifth-grade Elementary School students. This interactive media used Articulate Storyline based on instructional games. According to Rusman et al., (2012), one form of method in CBI is the instructional games model. This research and development activity was carried out in accordance with ADDIE development procedures. There were several obstacles in implementing research and development at the design stage to planning interactive media; thus, it took a long time. This was because the design must attract the interest of learning learners and that the information presented be entirely appropriate to prevent concept errors. The evaluation stage also experienced obstacles in the form of a late validation process by experts caused by conditions during this pandemic, so it also takes a long time. Then at the implementation stage, there were also obstacles when conducting small-scale trial research and usage trials. Small-scale trials and usage trials were conducted online through google meetings and zoom meetings because they were still in this pandemic period. The constraint on the usage trial was that researchers had to wait for the appropriate material.

This interactive medium received a very positive response from students. According to Hamid et al. (2020), Learning media is everything that can convey a message through various channels that can stimulate the student's mind, feelings, and willingness and can add new information to students to encourage the creation of a good student learning process so that they can achieve expected learning goals. Because students had also never received learning by using interactive media during learning. Students looked very enthusiastic and excited. Their learning motivation increased, and the students were interested in learning interactive media using Articulate Storylines during the product trials. In line with the statement, "The purpose of media is to increase student activity during the learning process, increase learning motivation in students, and as a variety of learning methods" (Untari, 2017). This was demonstrated by students' attitudes who were actively involved in learning activities and on time when joining zoom meetings and collecting problem exercises.

The fifth-grade homeroom teacher at State Elementary School 5 Saptorenggo Malang Regency and material and media experts validated this interactive media. Validators used the Likert Scale, which refers to Sugiyono (2013). Validation by material experts got a percentage of 89.81%, which, if interpreted in the categorisation criteria referred to Akbar (2013), it was known that interactive media using Articulate Storyline-based instructional games for teaching fractional material was entered at an interval achievement rate of 85.01% - 100% which fell into the category of very valid meaning interactive media using Articulate Storyline based instructional games can be used without revision. In the indicator of material assessment and material relevance, material experts gave criticism in the form of suggestions to use more than one example or note the rules to avoid student misconceptions of the illustrations given. In discussing games and writing true or false captions, it would be better to add an image caption that was correct so that students can determine the expected image according to the concept. In Setiawan et al. (2020), Robert

Mayer explained that signalling means that the media must have instructions to guide and facilitate students in using media. In line with the results of previous research, Nugraheni (2017). That is, interactive learning media is more directed and easy to use than creating a menu of instructions. The material developed on developing interactive learning media using Articulate Storyline referred to Basic Competency 3.1 & 3.2 and 4.1 & 4.2 content of fifth-grade elementary school mathematics lessons listed in The Indonesian Minister of Education and Culture Regulation No. 23 of 2016, which had been adjusted to the indicators and learning goals to be achieved (Indonesian Ministry of Education and Culture, 2016).

Validation by media experts in the form of interactive media Articulate Storyline based on instructional games obtained results of 86.9%, which fell into the category was very valid, meaning that the product in the form of interactive media Articulate Storyline based on instructional games could be used without revision. Designing an interactive learning media product was also needed so that the media could increase students' learning interest so that students would not get bored quickly when learning from home. This is in accordance with interactive media development; according to Ibrahim (2011), Multimedia development begins with designing a learning design based on the knowledge of how one becomes easy to learn.

Validation by the user was 86.8%, which falls into the category was very valid. This means that this interactive media was very valid and could be used without revision. User validators provided some comments; the media used was very good. This media was new: interactive media can be accessed anywhere and as a very efficient distance learning media. This was in line with the opinion of Surandika (2020). Media could be used as a technology to support distance learning activities involving students who do not have to consist of the unity of space and time and could access learning materials without being limited by space and time.

Interactive media product trials were done twice: small-scale and usage trials. Small-scale trial activities were conducted with five students and produced an average score of 94.3%. Furthermore, the results of the use trial conducted with 21 students scored 100%. The results of student assessments on problem exercises on small-scale trials also showed good grades. Based on the knowledge assessment results, namely from the practice of questions that had been done on a small-scale test, five students got an average score of 92. Based on the knowledge assessment results from the problem practice done in the usage trial, 21 students got an average score of 90.5. The average student value was above the Minimum Completeness Criteria score of 75. This showed that students already understand the material in interactive media using Articulate Storyline-based instructional games this fractional material. According to students, the media was exciting and easy to use. So that students were delighted and feel not bored when learning mathematics using this interactive media. In line with the results of previous research, Pratama (2019) states that students feel happy and enthusiastic when using learning media. It can be concluded that interactive media using Articulate Storyline-based instructional games is very interesting and can be used as an alternative to distance learning, especially in fractional material for grade V elementary school students.

CONCLUSION

The interactive media using Articulate Storyline-based instructional games obtained validity from material experts, media experts, and teachers with an average score of 87.83%, a very valid category. Moreover, the sales rate of 97.14% fell into an exciting category. The use of interactive media using Articulate Storyline-based instructional games can facilitate students in improving and understanding fractional material in grade 5

elementary school. Based on the results of student trials, it is advised that the media be used as a learning medium both online and offline. Since this interactive learning media product is limited to ordinary fractional material, it must be redeveloped with more comprehensive material. The use of interactive media using Articulate Storyline-based instructional games can facilitate students in improving and understanding fractional material in grade 5 elementary school. Furthermore, the product is reevaluated to be disseminated to the target by paying attention to several things related to the subject, situation and the intended condition.

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