

Mathematics Learning Video Media for Sixth Grade Elementary School

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Abstrak

Kurangnya penggunaan media pembelajaran di sekolah dasar berdampak pada kualitas hasil belajar siswa. Berdasarkan permasalahan tersebut, penelitian ini bertujuan untuk mengembangkan media dalam mengembangkan media video pembelajaran matematika berbasis pendekatan kontekstual untuk meningkatkan hasil belajar siswa sekolah dasar. Media video yang dikembangkan dengan menggunakan ASSURE ini terdiri dari 6 tahapan yaitu: *Analyze, State, Select, Use, Require, dan Evaluate*. Data yang dikumpulkan adalah data kualitatif dan kuantitatif. Pengumpulan data dilakukan dengan menggunakan metode observasi, wawancara, pencatatan dokumen, dan angket. Validitas media video diukur melalui uji ahli isi, ahli desain pembelajaran, ahli media pembelajaran, dan uji coba individu. Hasil penelitian menunjukkan bahwa: (a) hasil tinjauan ahli isi pembelajaran memiliki kualifikasi sangat baik dengan persentase (91,66%), hasil tinjauan ahli desain pembelajaran memiliki kualifikasi sangat baik dengan persentase (92,50%), (c) hasil review ahli media pembelajaran menunjukkan bahwa media video baik dengan persentase (93,33%), dan (d) hasil uji individu menunjukkan media video sangat baik dengan persentase (93,17%). Berdasarkan hasil penelitian ini, pengembangan media video pembelajaran matematika berbasis pendekatan kontekstual untuk meningkatkan hasil belajar dengan menggunakan model ASSURE pada pokok bahasan luas permukaan dan volume balok kelas VI menunjukkan kualifikasi sangat baik. Sangat cocok untuk digunakan di sekolah dasar.

Kata kunci: Media Video, ASSURE, Matematika

Abstract

Lacked use of instructional media in primary school impacted the quality of students learning outcomes. Based on the problem, this study is aimed to develop media in developing mathematics learning video media based on a contextual approach to improve the learning outcomes of elementary school students. These video media were developed by using ASSURE is consisted of 6 stages, namely: *Analyze, State, Select, Utilize, Require, and Evaluate*. The data that had been collected are qualitative and quantitative. Data were collected by using the method of observation, interviews, document recording, and questionnaires. Video media validity has been measured through testing content experts, instructional design experts, instructional media experts, and individual trials. The results of the study show that: (a) the results of the review of the learning content experts have very good qualifications with a percentage (91.66%), the results of the reviews of learning design experts have very good qualifications with a percentage (92.50%), (c) the results of expert reviews learning media showed that video media was good with a percentage (93.33%), and (d) individual test results showed that video media was very good with a percentage (93.17%). Based on the results of this study, developing mathematics learning video media based on a contextual approach to improve learning outcomes by using the ASSURE model on the subject of surface area and volume of class VI blocks shows very good qualifications. It is suitable for use in elementary schools.

Keywords: Video Media, ASSURE, Mathematics

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1. INTRODUCTION

In the current era of globalization, science and technology are developing rapidly through various innovations that are increasingly advanced along with the times (Afdareza et al., 2020; Guo, 2020; Hidayatullah et al., 2021). Education is one of the fields that has a considerable impact on the development of science and technology. Education is a learning process for individuals or students to understand something and make them critical thinkers (Mardiana, 2020; Rizaldi et al., 2020; Stuchlikova, 2016). The current development of Science and Technology (IPTEK) has changed aspects of human life in finding and finding information easily (Banggur et al., 2018; Hatip et al., 2019; Susanty, 2020). It causes humans

to access information more quickly and think ahead. Education is one of the fields that has a considerable impact on the development of science and technology. Education is a learning process for individuals or students to understand something and make them critical thinkers (Anisa, 2017; Hastari et al., 2019; Tri Pudji Astuti, 2019).

One of the subjects that can develop critical thinking skills in mathematics (Adinda, 2016; Parameswari & Kurniyati, 2020). Learning mathematics is difficult because many formulas and calculations exist to solve problems. Students are considered boring because they only find numbers, formulas, graphs, and still images, thus making students less interested in learning mathematics, especially geometry and measurement subjects, because they are abstract (Dewi et al., 2020; Kharisma, 2018; Ratnaningtyas, 2016). Geometry is one of the fields in mathematics that studies points, lines, planes, and spaces as well as their properties, measurements, and relationships with one another (Budhiharti & Suyitno, 2017; Istiyani et al., 2018; Nur'aini et al., 2017). When compared to other fields in mathematics, geometry is one of the fields that is considered the most difficult to understand. Abstract objects, such as cubes, blocks, prisms, pyramids, and so on, are examples of objects from geometric geometry (Batubara, 2017; Purba et al., 2022; Wahyudi et al., 2017).

The learning process in schools today is different from previous learning. This is due to the COVID-19 pandemic (Corona Virus Disease-2019)(Herliandry et al., 2020; Wisada et al., 2019). Distance learning is an obstacle for a teacher in delivering learning materials effectively to students because of the lack of adequate learning media (Sadikin & Hamidah, 2020; Yuangga & Sunarsi, 2020). Learning media are used as learning resources to assist teachers in enriching students' insights. With various types of learning media by teachers, they can be used as material in providing knowledge to students (Dwijayani, 2019; Fatimatuzahroh et al., 2019). The use of learning media aims to improve the quality of the learning process so that it can improve the quality of student learning outcomes (Insani, 2016; Melinda et al., 2017). In today's distance learning, learning media that is suitable for use, especially in mathematics subjects, is video media. The reason for choosing video media is that using the media can make it easier for students to learn the material of surface area and volume of blocks clearly, which is equipped with pictures that can increase understanding and be able to attract the attention of students to follow the lessons presented by the teacher so they can be motivated to learn with good concentration, and can improve student learning outcomes. Learning video media are media or tools that present audio and visuals that contain learning messages, concepts, principles, procedures, and theory of knowledge application to help understand a subject's learning materials (Nanda et al., 2017; Putri & Dewi, 2020).

Several studies regarding the development of instructional video media include research conducted by previous researchers, which stated that perceptions of learning became more positive with the attractiveness of using instructional video media to motivate students in learning Mathematics (Purwanti, 2015). Then other researchers stated that instructional video media showed students scored above the minimum completeness criteria set (Yuanta, 2019). Thus, it can be concluded that developing instructional video media is effective for the learning process. Other studies also state that the average value of teacher and student responses is very good, so the video can be said to meet the practicality criteria (Tamu et al., 2020). It shows that the learning video media fulfills the valid and practical aspects to be suitable for learning.

Learning will be more effective if it is associated with everyday life. The application of a contextual approach designed in video media is very suitable to be used so that students get a real picture of the concept being studied and become a distinct advantage because students are indirectly invited to understand the real concept in everyday life (Mutakinati et al., 2018; Sugandi & Bernard, 2018). A contextual approach is a learning concept where the teacher presents real-world situations in the classroom and a learning approach that helps

teachers emphasize the process of full student involvement to be able to find the material being studied and connect it to everyday life (Chong et al., 2019; Norhayati et al., 2018). Based on several problems and supporting theoretical studies, a video media for mathematics learning was developed on the subject of surface area and volume of blocks for sixth-grade elementary school. This study aims to develop a valid learning video media from the aspect of content, design, and media and effectively improve the learning outcomes of elementary school students.

2. METHODS

This study developed a learning video media for the sixth-grade mathematics subject using the ASSURE development model (Putrislia & Airlanda, 2021; Smaldino et al., 2008). The stages of the process in the ASSURE learning model are as follows. The first stage, student analysis, is to identify and analyze the characteristics of students related to learning outcomes. This information guides teachers in making instructional design decisions. Analysis of the characteristics of students includes: (a) General characteristics of students. The general characteristics of students can be seen from their age and level of development. Each experiences the following stages of intellectual development (Ekawati, 2019; Zubaidah, 2019). (b) Initial ability. Students' initial ability refers to the knowledge and skills that have and have not been possessed by students. (c) Learner's learning style. In this case, it explains how students interact and respond emotionally to the learning environment. Students learn in various ways, including audio, visual, audio-visual, and kinesthetic types. The second stage is to formulate standards and objectives. In this stage states, the standards and learning objectives should be specific. It starts with curriculum standards based on state and national learner performance criteria. Learning objectives are formulations or statements describing the knowledge, skills, and attitudes students will possess after learning. Learning objectives can use the formulation of objectives with the ABCD model, namely Audience, Behavior, Condition, and Degree. The elements that must be contained in the formulation of objectives: (1) the expected performance or capabilities of students; (2) Observable behavioral conditions; (3) Minimum criteria/standards for student behavior.

The third stage is choosing strategies, technology, media, and materials. After analyzing the learners and stating the standards and objectives, the next step is to determine the starting point (current knowledge, skills, and attitudes of learners) and endpoints (learning objectives) of teaching. The teacher's next task is to build a bridge between these two points by choosing appropriate strategies, technologies, learning media, and materials to achieve goals. The selection process involves three steps, namely (1) determining the right method for learning activities, (2) choosing a media format that is adapted to the method applied, and (3) selecting, modifying, or designing/producing teaching materials. The fourth stage is utilizing technology, media, and materials and using media and teaching materials for learning, such as reviewing teaching materials, preparing teaching materials, preparing the learning environment, preparing students, and determining learning experiences. These preparatory steps are carried out before the product developed is used by students. The fifth stage involves students in learning. This fifth stage involves the participation of students in learning activities. Instruction must require the active mental involvement of learners to be effective. Exercises may involve student self-examination, computer-assisted instruction, internet activities, or group exercises. The sixth stage is to evaluate and revise. The evaluation and revision stages in the ASSURE learning design model are carried out to assess the effectiveness and efficiency of the learning program and the achievement of student learning outcomes. It is necessary to evaluate all learning components to obtain a complete picture of the quality of a learning program.

The data collection instruments used in developing this video media were observation, interviews, document recording, and questionnaires or questionnaires. Questionnaires were used to obtain data from learning content experts, learning design experts, learning media experts, and individual trials. The types of data used in this study are qualitative data and quantitative data. Qualitative data in this study are the results of assessments, comments, suggestions, and responses from the test subject to the developed product. Quantitative data obtained from qualitative questionnaire data are converted into scores or scores. The results are then converted into a scale of five criteria for achieving the media feasibility level. The criteria set for giving meaning and decision-making are shown in [Table 1](#).

Table 1. Achievement Level with 5-scale Conversion

No	Achievement Level (%)	Qualification	Information
1	90 – 100%	Very good	No need to revise
2	75 – 89%	Good	Slightly revised
3	65 – 74%	Enough	Adequately revised
4	55 – 64%	Bad	Many things have been revised
5	0 – 54%	Poor	Repeated in making products

3. RESULTS AND DISCUSSION

Results

The research results on the development of learning video media were based on the ASSURE model, which consisted of six stages: Analyze, State, Select, Utilize, Require, and Evaluate. This research was conducted at SD Negeri 1 Blahkiuh. The first stage is Analyze Learners (analyze students). In the stage of analyzing the characteristics of students, the thing that must be done at this stage is the analysis of students' general characteristics, initial abilities, and learning styles. The results of the analysis of students at SD Negeri 1 Blahkiuh are as follows. In the analysis of the general characteristics of students, it was found that the sixth graders at SD Negeri 1 Blahkiuh have an age range of 11-12 years. The second stage is State Standards and Objectives. The standards set in learning at SD Negeri 1 Blahkiuh are based on the 2013 curriculum. The basic competencies and indicators formulated with the sixth-grade mathematics teacher at SD Negeri 1 Blahkiuh and the Advisor Lecturer are as follows. 3.7 Explaining the form of space which is a combination of several forms of space, as well as its surface area and volume, 4.7 Identifying the form of space which is a combination of several forms of space, as well as its surface area and volume. After determining the Basic Competencies and Learning Indicators, the learning objectives are formulated according to the ABCD (Audience, Behavior, Conditional, Degree) formula.

The third stage is Select Strategies, Technology, Media, and Materials. The selection involves several steps in determining this media: (1) Determining the method or approach following the students' characteristics. Based on the analysis of the characteristics and competencies of the students, the appropriate method used is the contextual approach. (2) The material in the video is a building material with the subject of surface area and volume of blocks. The material is compiled based on the source of the Book of Happy Learning Mathematics for the sixth grade of the 2013 Curriculum. As for the lesson plans that are prepared to direct learning activities to students using video media, with this lesson plan, the learning steps will be arranged systematically. (3) The form of media used is video media. This media is audio-visual media developed using the KineMaster Diamond application with the help of Microsoft PowerPoint software to produce images, text, sound, and animation. Some of the video media displays are shown in [Figure 1](#).



Figure 1. Display of Mathematics Learning Video Media

Based on Figure 1, this video media is designed as attractive as possible to increase students' interest and motivation in learning mathematics. The video media design designs are: making video scripts and making storyboards. The fourth stage is Utilize Technology, Media, and Materials (Utilizing Technology, Media, and Materials). Several things must be prepared: (1) Reviewing teaching materials. First, the thing to do is consider the learning material that will be delivered to students. Based on the results of interviews with the sixth-grade teacher, the material will be delivered based on the source of the Book of Happy Learning Mathematics for the sixth grade of the 2013 Curriculum. (2) Prepare teaching materials. After reviewing the teaching materials, the next step is to prepare them teaching materials. The subject matter that will be used in this research is the material of spatial structure with the subject of surface area and volume of blocks for sixth grade. The preparation of teaching materials includes: preparing lesson plans and making learning media in the form of videos. (3) Prepare a learning environment. This learning environment is intended to make students feel comfortable when learning occurs. What needs to be prepared is a clean, comfortable, and safe classroom atmosphere so that students can understand learning well. In addition, facilities to support video media are also prepared in the form of a laptop. (4) Prepare students. Learning at SD Negeri 1 Blahkiuh is currently being conducted online due to the COVID-19 pandemic, so students are limited in learning at school. With the Principal's approval, learning activities can be carried out on the condition that only three students come to school by complying with the health protocol. Students appointed to carry out activities at school are physically and mentally healthy and ready to receive good learning. (5) Determine the learning experience. The expected learning experience follows the learning objectives to be achieved. In determining the right learning experience, a lesson plan is needed as a design for student activities during the learning process. The learning model used is a contextual approach so that students are expected to be able to connect learning materials to the context of the real world.

The fifth stage Require Learner Participation (Involving Students in Learning). Student participation and involvement activities are carried out by learning following the RPP that has been prepared and the application of mathematics learning video media. As a result, students are fully involved during the learning process. The activities carried out by students and teachers are, first, the teacher prepares the facilities that will be used in learning, namely a laptop to access video media. The teacher prepares the media by displaying it on a laptop prepared in advance. The next stage is to play a mathematics learning video with the material of surface area and volume of a block prepared in advance. When the learning video media is displayed, the students look happy and very enthusiastic about watching the contents of the learning video media. The learning process went well and was fun as shown in Figure 2.



Figure 2. Activities When Displaying Video Media

The sixth stage is Evaluate and Revise. At this stage, evaluation and revision are carried out to obtain a complete picture of the quality of instructional video media. This activity is carried out by providing a questionnaire/questionnaire to learning content experts, learning design experts, learning media experts, and individual tests. The evaluation process is used to assess the results of expert validation, correct deficiencies after validation, and evaluate the results of the developed media trials. This assessment will be used to improve the media that has been developed. The expert review of content, design, learning media, and individual tests are presented in [Table 2](#) and [Table 3](#).

Table 2. The results of a Review by Content, Design, and Learning Media Experts

No	Respondent	Percentage
1	Learning Content Expert	91.66%
2	Learning Design Expert	92.50%
3	Learning Media Expert	93.33%
Average		92.49%
Category of content, design, and learning media expert response qualifications		Very good

Table 3. Individual test review results

No	Respondent	Percentage
1	First respondent	93.18%
2	Second respondent	90.90%
3	Third respondent	95.45%
Average		93.17%
Category of student response qualifications		Very Good

Based on [Table 2](#) and [Table 3](#), the assessment of student responses shows that students respond very well. Mathematics learning video media on the subject of surface area and volume of blocks based on a contextual approach is a learning media that connects material with everyday life to increase students' interest in learning mathematics. While the revision is used to correct the shortcomings and weaknesses of the results of the validation of content, design, and learning media experts, after the product has been assessed for feasibility, it is still necessary to revise the developed video media. The revision was carried out to improve the quality of the products developed. Inputs, suggestions, and comments from experts are presented in [Table 4](#), [Table 5](#), and [Table 6](#).

Table 4. Feedback, Suggestions, and Comments from Learning Content Experts

No	Feedback, Suggestions, and Comments
1	Add the proof of the formula for the surface area and volume of the block to the material.
2	Fix the line segment on the edge of the beam using the correct line segment symbol

Table 5. Feedback, Suggestions, and Comments from Learning Design Experts

No	Feedback, Suggestions, and Comments
1	Fix learning indicators
2	Added TPACK model to lesson plan

Table 6. Feedback, Suggestions, and Comments from Learning Media Experts


No	Feedback, Suggestions, and Comments
1	Replacing the block frame image into a block building
2	Change the text color so that it contrasts with the background.
3	Added background volume to make it more audible

Product revisions are carried out based on suggestions and inputs provided by experts. There are several discussions regarding the revisions made by researchers for product improvement according to input, suggestions, and comments from subject matter experts, learning design experts, and learning media experts. The revised display based on input from learning content experts is shown in Figure 3, Figure 4, and Figure 5.

d. Rumus Volume Balok
Balok mempunyai ukuran panjang = p, lebar = l, dan tinggi = t dan alas balok berbentuk persegi panjang sehingga luas alasnya adalah $p \times l$ (panjang x lebar). Jika volume balok = luas alas x tinggi, maka rumus volume balok adalah:

Volume Balok = $p \times l \times t$

Pembuktian Rumus Volume Balok



Misalkan kubus tersebut memiliki volume 1 satuan. Maka jika beberapa kubus yang memiliki volume 1 satuan disusun maka volumenya akan bertambah. Perhatikan gambar berikut ini:

Balok tersebut memiliki volume 16 satuan karena memiliki 16 satuan kubus. Cara untuk mengetahui banyaknya kubus dalam balok tersebut, dapat dihitung dengan dua tahap yaitu:

Tahap 1 : Menghitung jumlah kotak yang berada pada sisi depan.

c. Rumus Luas Permukaan Balok

Lp = $2 \times ((p \times l) + (p \times t) + (l \times t))$

Keterangan:
Lp = Luas permukaan balok
p = ukuran panjang balok
l = ukuran lebar balok
t = ukuran tinggi balok

d. Rumus Volume Balok
Balok mempunyai ukuran panjang = P, lebar = L, dan tinggi = t dan alas balok berbentuk persegi panjang sehingga luas alasnya adalah $p \times l$ (panjang x lebar). Jika volume balok = luas alas x tinggi, maka rumus volume balok adalah:

Volume Balok = $P \times L \times t$

Figure 3. The Revision Adds Proof of Formula to the Material

Balok memiliki beberapa unsur, yaitu:

- Balok memiliki 6 sisi yaitu:
Pada bidang tegak : (ABFE, DCGH, BCGF, ADHE)
Pada bidang alas : (ABCD)
Pada bidang atas : (EFGH)
- Balok memiliki 12 rusuk yaitu:
Rusuk panjang : (AB, EF, CD, GH)
Rusuk lebar : (AD, BC, FG, EH)
Rusuk tinggi : (AE, BF, CG, DH)
- Balok memiliki 8 titik sudut yaitu: (A, B, C, D, E, F, G, H)
- Balok memiliki 12 diagonal sisi yaitu: (AF, BE, DG, CH, BG, CF, AH, EG, FH, AC, BD)
- Balok memiliki 4 diagonal ruang yaitu: (HB, GA, EC, FD)
- Balok memiliki 4 diagonal bidang yaitu: (ADGF, BCHE, ABGH, CAEGC, BDHF)

Dari gambar tersebut, unsur-unsur balok yaitu:

- Balok memiliki 6 sisi yaitu:
Pada bidang tegak : (ABFE, DCGH, BCGF, ADHE)
Pada bidang alas : (ABCD)
Pada bidang atas : (EFGH)
- Balok memiliki 12 rusuk yaitu:
Rusuk panjang : (AB, EF, CD, GH)
Rusuk lebar : (AD, BC, FG, EH)
Rusuk tinggi : (AE, BF, CG, DH)
- Balok memiliki 8 titik sudut yaitu: (A, B, C, D, E, F, G, H)
- Balok memiliki 12 diagonal sisi yaitu: (AF, BE, DG, CH, BG, CF, AH, DE, EG, FH, AC, BD)
- Balok memiliki 4 diagonal ruang yaitu: (HB, GA, EC, FD)
- Balok memiliki 4 diagonal bidang yaitu: (ADGF, BCHE, ABGH, CDEF, AEGC, BDHF)

Figure 4. Revise the Correct Line Segment Symbol

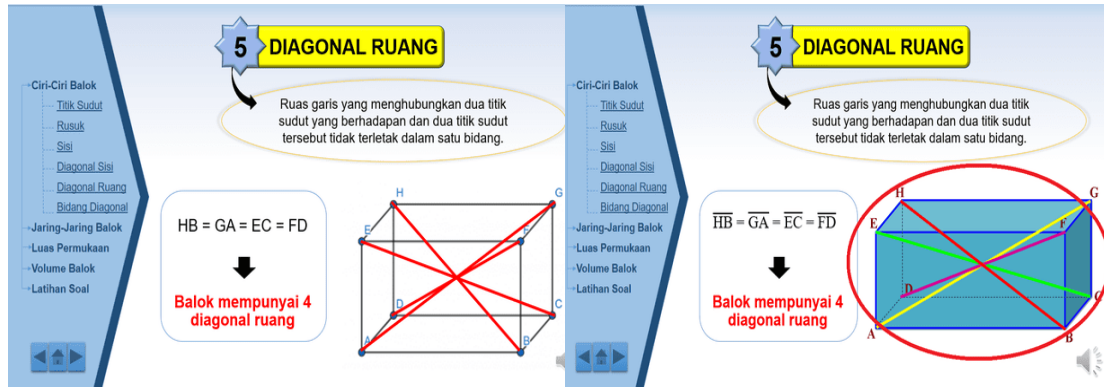


Figure 5. Revision of the Beam Frame Drawing on the Material

Discussion

The research results on the development of learning video media were based on the ASSURE model, which consisted of six stages: Analyze, State, Select, Utilize, Require, and Evaluate. This research was conducted at SD Negeri 1 Blahkiuh. This research only reached the development stage because the purpose of this study was only to find out the validity and feasibility of the developed media. In the analysis of the general characteristics of students, it was found that the sixth graders at SD Negeri 1 Blahkiuh have an age range of 11-12 years. The theory of cognitive development states that students in this age range have the following characteristics: have the ability to understand concepts, classify, and be able to view an object from a different point of view objectively. Furthermore, based on interviews with sixth-grade teachers at SD Negeri 1 Blahkiuh, students' initial abilities still have difficulty learning mathematics, especially geometry material. The learning process carried out by teachers is still using conventional methods so that only a few students are interested in learning mathematics. The lack of learning media also causes teachers to have difficulty delivering learning materials to students, and student learning outcomes show that some are still below the minimum completeness criteria.

The right learning style as an alternative to overcome the problems that occur in SD Negeri 1 Blahkiuh is the audio-visual learning style. Based on this learning style, video media is the right media to be developed. Video is audio-visual media, which is media that can be heard and seen simultaneously (Gunawan, 2020; Satrianawati, 2018). This medium moves the senses of hearing and sight simultaneously. So, video is the right media to facilitate sixth-grade students at SD Negeri 1 Blahkiuh learning mathematics. Based on the results of the validity and feasibility tests, the assessment of student responses showed that students responded very well. Mathematics learning video media on the subject of surface area and volume of blocks based on a contextual approach is a learning media that connects material with everyday life to increase students' interest in learning mathematics. Mathematics learning video media on the subject of surface area and volume of blocks based on a contextual approach is a learning media that connects material with everyday life to increase students' interest in learning mathematics.

It is in line with previous research, which states that video media can foster student interest and video can visualize abstract material and connect it to real-world life (Wahyuni & Yokhebed, 2019). It is also supported by other research that aims to determine the effect of using video in teaching on students' cognitive and affective aspects in learning mathematics (Lalian, 2018). The results showed that using video as a medium for learning mathematics plays a role in increasing students' learning motivation, increasing students' knowledge and understanding of lessons, and improving student achievement. This development research implies that students can use this media to help and make it easier to understand the material,

especially geometric material in learning mathematics. In addition, this research implies that teachers are helped in explaining the material to students and solving problems experienced by teachers based on a contextual approach. With this research, it is hoped that it will become one of the options in helping implement the learning process in schools. This research is far from perfect because it is still limited to the development of interactive video media on geometric line material, so there is hope that there will be other research that can develop interactive video media with a wider scope of material.

4. CONCLUSION

Based on the video media validity data analysis results from the content, design, and learning media aspects, they are in the "very good" category. The attractiveness of the media in the individual test is also in the "very good" category. It can be concluded that the contextual approach-based mathematics learning video media effectively improves mathematics learning outcomes in sixth-grade elementary school students. The applied multimedia has implications for increasing learning motivation, making it easier for students to understand the material during the COVID-19 pandemic and for teachers to apply mathematics learning with a contextual approach.

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