Interactive media-based video animation and student learning motivation in mathematics

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Abstract. Mathematics is an essential subject in school and is used in everyday life. In learning, of course, it takes motivation to learn. Motivation in learning is very necessary for students. This is certainly to support the success and objectives of learning, especially in learning mathematics. However, the level of student motivation in mathematics is still low. Therefore, it is necessary to have appropriate learning strategies to increase student motivation. One of them is by developing learning media. This article examines the theoretical framework of student motivation and learning media. The method used in this article is a literature review by collecting data from various published scientific journals and other relevant sources. The results of this article indicate that in order to increase student learning motivation, it is necessary to have learning media that can mark students’ interest in learning in mathematics. One of them is by developing interactive media that is attractive to students. Both in terms of appearance and content of the media. The development of interactive media-based video animation can increase student learning motivation in mathematics.

1. Introduction
Learning motivation affects student learning activities in achieving learning goals. Sadiman [1] explains that motivation to learn serves to encourage humans to determine the direction of their actions and choose the actions that must be done. Motivation also functions as a business driver and learning achievement for students. In the learning process, students who have high learning motivation will follow the learning process well; otherwise, students who have low learning motivation will not focus on learning.

Motivation is characterized by having the drive and needs in learning, show interest and attention to the task given, persevering in the task; tenacious, and have a desire to achieve learning goals [2]. However, in the learning process, there are still students who have problems from within themselves and hinder the learning process. This is seen when the learning process takes place, especially in mathematics. Many students fail at their assignments, lack concentration, and are less enthusiastic about learning [3]. This results in a lack of motivation for students to learn.

Mathematics is one of the important subjects that must be mastered by every student. This is, of course, because mathematics is directly related to the daily life experienced by students [4]. Therefore, it is important to increase students’ motivation for mathematics. The development of information and communication technology in the 21st century has developed very rapidly. This development can be
seen from the many uses of technology in various sectors, both communication and education. The technology used in education certainly helps to improve the quality of teachers and make learning in the classroom more effective.

The development of technology also develops learning media that can help students to understand the material. One of the things teachers can do to make learning fun and increase student motivation is to use learning media that is appropriate to student characteristics, time, material, and effective use of media. Teaching aids or learning media have several types, audio (sound), images (visual), moving pictures (video), animation, visual aids (trainers), or mock-ups (mock-ups) are some examples.

Eva [5], in her research, stated that there was an influence on the use of the ASSURE model application on student motivation and learning outcomes. The use of this application helps students to be motivated in learning activities. Bernard and Sunaryo [6] examined the effect of GeoGebra JavaScript applications on student motivation. They found that application-based learning media can increase student motivation in learning mathematics. So it can be said using appropriate technology, and learning media will increase student motivation, especially in mathematics.

This paper will propose efforts to increase motivation through interactive media based on the animated video. This is because students still like animation in the form of cartoons, media that have bright colors, and pleasant audio or sound. This article discusses the development of animated video-based interactive media to increase student motivation in learning mathematics.

2. Methods
This article is a literature review method. A literature review is a research and development method conducted to collect and evaluate research related to a particular topic [7]. In this article, the literature review method aims to collect all relevant information from documents such as books and journals published in 1954-2020. It can be research articles, books from database google scholar, ScienceDirect, researchget, eric, and SpringerLink. With keywords of these articles and books is “video animation” and “motivation.”

3. Results and discussion

3.1. Learning motivation
Motivation is one important element in learning for students and teachers. Motivation in learning is very necessary for students in learning activities to achieve the objectives of learning. Motivation starts from the word “motive” which means as an effort or encouragement in a person to be able to do something. Motives can also be said as a mobilizer in a person to be able to do certain activities to achieve the desired goal. Maslow explains that motivational actions are based on actions from within a person [8].

Motivation is a driving force in actions that are applied in behavior, so students who have high motivation will be motivated to start learning [9]. The motivation impulse will direct someone to be able to act in achieving the desired goals actively. According to Huitt [10], motivation is some internal and external processes for individuals, which causes enthusiasm in carrying out learning activities or certain other activities. Sadiman [1] explains that motivation to learn serves to encourage humans to determine the direction of their actions and choose the actions that must be done. Motivation also functions as a business driver and learning achievement for students.

Several indicators support the occurrence of motivation in a person, including Hamzah [11] formulating indicators of learning motivation, as follows: 1) there is a desire and desire to succeed; 2) the existence of encouragement and learning needs; 3) there are hopes and aspirations for the future; 4) there is an appreciation or reward in learning; 5) there are interesting activities in learning; 6) the existence of a conducive learning environment, so students can have a good learning environment [11].

Motivation has a role and function in the learning process. Hamzah [12] explains the important role of motivation in learning, namely: can determine the strengthening of learning; clarify learning objectives, determine someone’s perseverance in learning. Besides, the function of motivation in learning is also expressed by Hamalik [13], which encourages actions and also acts as a mobilizer. This
means that the role and function of motivation are as a driving force for the effort and achievement of something, in this case, student achievement.

Also, Wuryanti and Badrun [14] have researched the development of animated video media to increase the learning motivation and character of elementary school students. The results obtained from these studies are a significant increase in the use of video animation in learning. It can be said that motivation in students can be increased through the help of learning media that attract students’ interest to learn.

3.2. Interactive media video animation

Media are all forms and channels used to convey information or messages. Media comes from the Latin word, which is a plural form of the word “medium” which means “intermediary” or “introduction”. That is an intermediary between a message source and the recipient of the message. About learning, the media means a channel of learning messages from the teacher to students.

Association for education and communication technology (AECT) (1977) explained that the media are all forms used for the process of channeling information [15]. The education association (NEA) in Yasmin & Karmila [16] defines that the media as objects that can be manipulated, seen, heard, read, and discussed along with instruments used both in teaching and learning activities that can affect the effectiveness of instructional programs.

One type of media is audio-visual, which is media that can be seen and heard simultaneously. Examples of audio-visual media are television, film, and video. Audio-visual media is often referred to as interactive media or interactive multimedia. According to Hofstetter [17], multimedia is also a system consisting of computer hardware and software by making it easy for users to combine images, videos, photography, graphics, and animations with sound, text, and data controlled by computer programs. Interactive media itself has characteristics, Ariani and Haryanto [18] say that the characteristics of interactive media are: 1) having more than one convergent media, one of which is by combining audio and visual elements; 2) is interactive, i.e., able to accommodate user responses; 3) are independent in nature, i.e. providing convenience and completeness of the material so that users can use it without guidance from others.

Animated video media is one example of interactive media. This animated video media can be visualized for making graphic media in the form of animated cartoon images supported by Adobe Flash CS 6 application software and Adobe After Effects to create interesting animated videos. The result of the application will be an animated video that displays interesting images and storylines. Contento explains that the use of colors and pictures could increase children’s motivation in receiving messages [16]. This is in line with the use of animation media that utilize technological developments by increasing knowledge to facilitate the delivery of information to students.

Furoidah explains that animated video is a learning medium that contains a collection of images that produce images and is equipped with audio so that they have a living impression and a learning message [19]. Febriani explains that animated video can be able to describe something complicated or complex into just images and sentences [20]. Of course, this has become one of the alternatives that can be done by the teacher to create a learning medium with an animated form if the material is difficult to explain or convey to students. This is also in line with the learning styles held by students. Each student with different learning styles, the use of animated media will clearly support the characteristics of student learning styles, both visual, audio, and audio-visual.

Akamca et al. [21] in his study said that the use of the concept of video animation in learning is one way to improve student learning outcomes and also reduce the level of misunderstanding that occurs in students’ every learning process. Besides, the use of video media animation also prevents students from getting bored, because video animation can present forms and atmosphere that is fun, funny, and relaxed, but still on the main goal, namely learning material [22].

The research of developing instructional media in the form of animated motion graphics videos obtained is that the use of animated motion graphics videos on natural science subjects is very effective in learning and can improve student achievement and learning knowledge [23]. Ikhwanul researched by
developing animated video media on elementary student learning outcomes. The results obtained are the use of video animation affects student learning outcomes, indicated by an increase in the average value of students in grade II elementary school [18].

3.3 Interactive media based on animated video to increase motivation for learning mathematics

In mathematics, we need interesting learning media. Especially if it is made with interactive media in the form of videos that combine images, animation, music, and sound. The video can motivate and also attract the attention of students [24]. In line with research results, the use of animated videos makes learning more interesting and enjoyable [23].

| Scene Sketch | Dialog | Background | Sound | Information |
|--------------|--------|------------|-------|-------------|
| Playground   | Music intro | Introduce character |
| Playground   | Happy music instrument | Danu and friends are playing in the playground. Danu bring a lot of candies and want to share it with his friends fairly. |
| How do you get all your friends to get candy? | -orange plain | Music instrument | Interaction between video and audience. |

The application of animated video media in mathematics learning for grade II elementary school uses the help of the Adobe Software application. By using two Adobe applications, namely Adobe Flash CS 6 and also Adobe After Effects. To provide an interesting and colorful picture to increase motivation and desire to learn for students.

In addition to using bright colors, we can consider the use of music, sound, and layout to be able to make students focus on the process and learning material through animated videos. Not only by giving the material in the learning video, but there is also a question session. This is done in addition to making the media enjoyable to look at, also to get interactive learning media for students. Interaction is needed so that students do not just watch, but get involved in the storyline that is displayed in the animation. Here is the storyboard for the animated video (see table 1).
Displaying animated videos that tell about everyday experiences that are common in the student environment, audio, and visuals are right, which will make students indirectly participate in the storyline. This will make students happy in learning and be motivated in themselves to want to learn. Besides, the use of animated videos described by Gellerstedt et al. said that the learning video would make students understand abstract material and understand the topic of the material presented easily [25]. Khalid et al. also revealed that the use of animated video media could make science lessons more interesting and enjoyable [26].

Wuryanti and Badrun [14] have also researched the development of animated video media to increase the learning motivation and character of elementary school students. In the development of video animation media, it is said to be very effective in increasing students’ motivation and characteristics. The use of instructional media in the form of video animation in this study produces learning media that is suitable and also fun for students.

4. Conclusions
Motivation is an internal and external process for individuals, which creates an enthusiastic attitude in carrying out learning activities or certain other activities. In learning, motivation is needed for each student to achieve the desired learning goals. One of the things that can increase student motivation is to use appropriate learning media.

Learning media is a media or intermediary of learning material from teachers to students. The motion animation video is one form of learning media that can be given to students. Animated video can be able to describe something complicated or complex into just images and sentences. Of course, this has become one of the alternatives that can be done by the teacher to create a learning medium with an animated form if the material is difficult to explain or convey to students.

The use of animated video media can increase student motivation in learning. Especially in mathematics, which is sometimes difficult for students. Based on previous research, animation media, besides having attractive visuals, also have audio that will help students’ different learning styles. The use of this media is expected to be one alternative that can be done by the teachers to be able to facilitate students’ understanding of mathematics subject matter.

Using interactive video-based interactive media can also be done in other lessons. Besides, not only to increase motivation, other aspects such as skills and learning outcomes can also be learned from the development of interactive media.

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