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Motion graphics learning media: Development using adobe after effects for 10th grade animal kingdom material

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A R T I C L E   I N F O

A B S T R A C T

Animal kingdom is one of the most complex materials in biology learning. Therefore, learning media is needed to support the learning process of teachers and students on animal kingdom material. This study aims to develop motion graphics learning media for 10th grade animal kingdom material. This research is a type of research and development (R&D). The development in this research refers to the 4D (four-D) model by S. Thiagarajan, Dorothy S. Semmel, and Melvyn I. Semmel. This research was conducted at SMA Negeri 1 Kota Jambi. The subjects of this study were 27 students and biology teachers in class XI MIPA 1 and XI MIPA 2. The research data was obtained by distributing questionnaires to the teacher and students. After the data was obtained, the data were analyzed quantitatively with the percentage formula. The results showed that the motion graphics learning media for 10th grade animal kingdom material was feasible to use. Based on the results of material validation, media validation, teachers' response, small group test and field test, the percentage of media eligibility was 88%, 87.6%, 94.7%, 94.4% and 93.3% with very good category. Based on the data obtained, it can be concluded that the motion graphics learning media for 10th grade animal kingdom material is feasible to be used as a supporting media in learning. Furthermore, the dissemination process is carried out by distributing product link to the teacher and students.

INTRODUCTION

Education is one of the priority goals of national development, because through quality education human resources will be created in an effort to face a life that is full of competition. Efforts to improve the quality of education can be done from the smallest effort through learning in class by increasing students' interest and learning motivation in learning in class. One of the efforts to improve the quality of education can be done by applying learning using technology in learning (Sulastri, 2020).

The development of information and communication technology is currently encouraging reform efforts in the use of technology results in the teaching and learning process. Therefore, teachers are required to be able to develop skills in designing and making learning media that will be used to support the achievement of learning objectives. As one of the technologies in education, ICT also has a tendency to encourage student interest and provide many benefits to the learning process. But the reality on the ground, there are still many learning processes that have not used this ICT-based learning media (Rosdiana, 2018).

At first, learning media were only considered as a means or tools to help students in teaching activities (teaching aids). Teaching aids which are then used are visual aids such as pictures, models or other real objects. According to (Murdiyanto & Mahatama, 2014) and (Khotimah dan Risan, 2019) The use of these tools aims to provide a more concrete learning experience, motivate and enhance the absorption and memory of students in the learning process. Around the middle of the 20th century, the use of visual tools began to be equipped with audio equipment so that audio-visual learning equipment was born. Efforts to make abstract lesson concepts more concrete continue to be made from time to time. So that at this time the media is no longer seen as a learning aid only, but also plays an important role in bringing learning messages which are an integral part of teaching and learning activities (Falahudin, 2014).

Regarding the rapid development of technology, the role of the media is very important, one of which is in the field of education. According to (Miftah, 2013) and (Fatmawati et al., 2018), learning media in the form of technology occupies a strategic position in facilitating learning. The range of learning has also become wider (distance learning) and faster (access to the internet or learning via computers). Delivering material in a conventional way is considered boring for some students, so another way is needed to deliver the material so that students can understand the learning content that has been delivered. This is in accordance with research conducted by (Efendi, 2020) showing that when the teacher delivers material in a conventional way using only book media, students quickly feel bored, less motivated, and do not focus on the lesson causing students to be unable to understand the content of the learning that has been delivered . This then has an impact on the less optimal student learning outcomes. Low learning outcomes can be seen from the value of daily assignments and tests that are below the minimum completeness criteria. The use of learning media must also be adapted to the learning characteristics of students. Learning media is a solution to overcome differences in student learning styles. According to (Saputri et al., 2018), learning activities using media can increase motivation because of their interest in learning media which can provide text, images, video, audio and other animations. The use of media in learning not only makes it easier for students but also can make it easier for teachers in the communication process of delivering learning material (Rozie, 2018).

Learning media is one element that cannot be separated from the teaching and learning process in order to achieve educational goals in general and learning objectives in schools in particular. The existence of learning media will make it easier for teachers to explain the subject matter to students so that students are also easy to catch and understand the material that has been delivered by the teacher. Therefore, there is a great need for learning media that can deliver students' understanding to solving learning problems in the classroom. In this case, the role of ICT in education is very much needed, namely the use of learning media that utilizes ICT.

According to (Apriyani, 2017), the lack of precise media used in learning is able to influence student motivation in learning, so that it becomes one of the learning problems that need to be immediately found a solution. The way that can be done to overcome these problems is to use learning media that utilizes ICT so that learning biology becomes easier and more interesting. One of the ICT-based media that can be used in learning is Motion Graphics.

Based on the focus group discussion held by the Master of Science Education at the Jambi University with senior high school biology teachers from several districts/cities in Jambi Province, it can be concluded that the obstacles experienced by teachers in learning are the lack of availability.

appropriate learning media that can be used as a teacher's tool in delivering teaching materials to students in an interesting and effective manner. In addition, the discussion forum in the context of research needs for biology education at the high school level also identified several topics that were considered complex, one of which was animal kingdom.

The data obtained by the researcher through the observation of 27 students of X MIPA 1 and 6 biology teachers at SMA Negeri 1 Kota Jambi also showed that animal kingdom is a difficult and complex material. As many as 66.7% of teachers and 92.6% of students agree that animal kingdom is a relatively difficult material. Meanwhile, all teachers and 96.3% of students agree that animal kingdom is a relatively complex material. All Teachers and students also stated that animal kingdom material requires media for learning.

Observation data also shows that there are obstacles experienced by teachers and students related to learning media. As many as 85.2% of students and 50% of teachers stated that the availability of learning media for animal kingdom was still relatively small. Whereas 92.6% of students and all teachers stated that it was necessary to develop better learning media for material in the animal kingdom. All teachers and students also expressed an interest in using Motion Graphics learning media for royal animals. The data also shows that many students have a learning style that suits audio-visual media more than other types. 44.4% of students have a global learning style, 14.8% auditory learning style, and 29.6% visual learning style. This supports that mobile graphic media is feasible to be developed. This is in line with research conducted by (Ridho, 2017), there is an increase in higher learning outcomes for students by using similar learning media, namely animation. The media increases students' positive attitudes in participating in the learning process and understanding the material presented by the teacher. Based on this description, the researcher developed Motion Graphics learning media to facilitate learning of the animal kingdom material for grade 10. Motion graphics is a term used to describe professional graphic design in creating dynamic communication designs for film, television and the internet. Motion graphics are a mash-up of cut visual design elements that combine film language with graphic design, 2D and 3D elements. The media included are still images, bitmap formats, vectors, video and audio data. In motion graphics applications, making compositions includes a timeline, resolution, count of frames per second and size (Wiana, 2017).

Basically, motion graphics can be said to be similar to infographics, but use animation to create a series of motion illusions. Motion graphics are generally a combination of visual media-based design pieces that combine film language with graphic design, such as incorporating 2D and 3D design elements, animation, video, illustration, photography, and music. However, videos or movies of moving objects are not yet categorized as part of motion graphics, unless they are combined with some vector elements, such as shapes, types, or lines (Desca Refita Putri, 2017).

Animation consists of 4 main levels, namely motion, locomotion, interaction, and emotion. Motion graphics use animation level "motion" which is simpler in its movement, which emphasizes moving objects and exploring compositions. Motion graphics is a subset of graphic design because in its manufacture it uses graphic design principles, namely object-oriented and still image media with vector formats, video and audio data. Vector illustration in motion graphics, apart from functioning to attract the attention of the audience, also aims to clarify the information message conveyed. In addition, it is easier for viewers to remember concepts and ideas so that viewers are motivated to see and understand the information on the video (Sari, 2019).

Motion graphics are media that use video recordings and or animation technology to create the illusion of motion and are usually combined with audio for use in a multimedia output. This term is useful for distinguishing still graphics from graphics with a changing appearance over time (transforming graphics). Motion graphics consist of visual elements such as lines, points, shapes and spaces mixed with visual ideas in rhythm, emphasis, and contrast and then combined with sound and motion. An important element in motion graphics when compared to other graphic works is the presence of motion and sound. Because of this, motion graphics can show artistic expressions that are different from static visual arts and create better communication with the audience and convey complex concepts in a simpler format (Kharishma et al., 2018).

Motion graphics is a kind of communication design mode of doing creative design combined with text, graphics, sound, animation, video and other elements. In recent years with the rapid development in intelligent mobile client and network, MG is gaining widespread recognition and reception and opening up a new era of reading pictures. Different from the previous static graphic, MG is a dynamic

graphic form of video. Dynamic graphic embodies the direction of an application in the field of modern visual communication and also reflects a kind of design concept or technique (Geng, 2016).

Motion graphics are actually part of animation techniques, where motion graphics is one of the categories of animation fields. Michael Betancourt, a film theorist, in an article titled The Origins of Motion Graphics reveals that motion Graphic is a graphics medium operated using video recording or animation technology to create the illusion of motion or rotation, and is usually combined with audio for use in multimedia projects for various purposes of publication, one of which is used as a medium of learning. Basically motion graphic means moving picture. Called a moving image because in the process of making it used many images sequentially and manipulated in such a way so it looks as if the image can move. The aim is to deceive the human eye into believing that there is movement. As an illustration can be found in a unmoving image, then the image is moved through changes made regularly and slowly, thus giving the impression of life. Motion graphics are often used for television commercials, opening bumper, or for the purposes of visualizing various events (Wiana, Syaom Barliana, & Riyanto, 2018)

According to (Satra et al., 2016), Adobe After Effects is one of the software or software that can be used to develop learning media in the form of animation and other vector-based videos. Adobe After Effects can also be integrated with many databases, making it flexible and easy to use with other software. In Animal kingdom material, the use of learning media will be very helpful in integrating the material. Therefore, researchers are interested in conducting research on the development of learning media using Adobe After Effects software, especially on animal kingdom material.

Based on research conducted by (Sa'adah et al., 2017), history learning media in the form of Motion Graphics videos are effective for use in learning Indonesian history in class XI of SMA Negeri 1 Bangsri. This is based on the results of the average student interest in learning in the experimental class which has a better difference of 13.2 than the average interest in learning in the control class which is only 7.1. In this study, Motion Graphics media was developed for the subject of Indonesian History, while the Motion Graphics media developed by the researcher was for biology subjects, especially animal kingdom material for 10th grade Senior High School. According to (Tarwoto & Sudaryanto, 2018) regarding the Feasibility Test for Motion Graphic learning media through Alpha testing shows that animated videos are feasible to be tested using beta testing because they are in accordance with the storyboard. Then from beta testing 72.58% of student responses stated that video-animated learning media was clear, interesting, and attractive, the sound quality was clear, and fun. And the material presented is easy to understand, and the material is discussed accordingly. In this research, Motion Graphics media was developed for Citizenship Education subjects, while the motion graphics media developed by researchers were for biology subjects, especially material in the animal kingdom.

Based on research conducted by (Sari, 2019) states that the use of animated motion graphics video as a visual communication medium can make information packaging more attractive. Besides functioning to attract the attention of the audience, motion graphics can also clarify the information message being conveyed. In addition, it is easier for viewers to remember concepts and ideas so that viewers are motivated to see and understand the information in the video. This research developed Motion Graphics media regarding the dangers of addictive substances for teenagers, while Motion Graphics media was developed by researchers for biology subjects, especially animal kingdom material. Research conducted by (Purwanti & Haryanto, 2015) shows that product development in learning media in the form of motion graphics for Citizenship Education Grade 1 Elementary School with the subject matter "Different But One" is appropriate as a learning resource. Movement Graphic learning media products can improve students' critical thinking skills in Citizenship Education subjects on the subject "Different But One" which is manifested in the learning outcomes test scores of product effectiveness tests in the medium category. In this study, the Motion Graphics media was developed for Civics class I Elementary School subjects, while the Motion Graphics media developed by the researchers were for biology subjects, especially animal kingdom material for grade 10.

Several studies related to the development of the Motion Graphics learning media indicate that Motion Graphics is appropriate to be used as a learning resource in learning activities, because this media can be used on smartphones and can be repeated so that students can learn independently (Romadonah & Maharani, 2019). Therefore, the researchers developed Motion Graphics learning media that is different from previous studies, namely Motion Graphics media for animal kingdom material for 10th grade.

METHODS
Research Design

The development model in this study refers to the research and development model developed by Thiagarajan, namely 4D (four-D). The development model in this study refers to the 4D (four-D) research and development model. This model consists of 4 main stages, there are define, design, develop, and disseminate (Multyaningsih, 2016).

Population and Samples

The experimental subjects in this study were six students in XI MIPA 1, 36 students in XI MIPA 2 and 1 biology teacher for 10th grade. The trial was conducted to determine the assessment of teachers and students on the developed learning media. The trials were conducted with small group trials, large group trials and teacher assessments. A total of 36 student respondents for the large group trial, six student respondents for the small group trial and 1 teacher respondent for teacher assessment.

Instrument

According to Nasution (2016) the research instrument is very important in data collection. The research instrument used was a questionnaire for media experts, material experts, teacher responses, small group tests and field tests. The research instruments are in the form of questionnaire for media experts, material experts, teacher response, small group test and field test. This instrument contains aspects related to the final product of the media which includes the feasibility of the developed media. The media aspect validation questionnaire contains the suitability of learning media seen from the aspects of language, presentation, and overall display feasibility. expert qualifications that validate this instrument are experts in the fields of education, learning media, instruments, language and Animalia materials. The validity of the instrument used is very good because it has been validated by several instrument experts.

Procedure

This research was conducted by following several procedures, there are define, design, develop, and disseminate. Define, contains activities to determine what products will be developed along with their specifications. This stage is a needs analysis activity carried out through research and literature studies. Design, contains activities to make designs for products that have been determined. Development, contains activities to make a design into a product repeatedly until the product is produced in accordance with the specified specifications. Dissemination, contains activities to disseminate products that have been tested for use by others (Sugiyono, 2019).

Figure 1. 4D development model (Maydiantoro, 2021)

Data Analysis Techniques

The data analysis technique used in this research is descriptive qualitative, namely in the form of interpretation of data from media validator questionnaires, material validators, students and teacher assessments. In data analysis, a scale is used to examine and assign the value of a qualitative factor in a quantitative measure. In another sense, the scale is used to change the assessment of a qualitative

variable to be quantitative. The scale used in the data analysis of this research is the Likert scale. According to (Sugiyono, 2019), in research and development, the Likert scale is used to develop instruments used to measure attitudes, perceptions, and opinions of a person or group of people towards the potential and problems of an object, the design of a product, the process of making products and products that has been developed or created.

RESULTS AND DISCUSSION

Motion graphics learning media for 10th grade animal kingdom material was developed using a 4D development model. The development stages of this model are define, design, development, and dissemination. The first 4D model stage is the define stage, which consists of initial analysis, student analysis, task analysis, concept analysis and analysis of learning objectives. This stage is carried out to determine the needs and circumstances of students who will be the target users of the product.

Based on the analysis conducted on 10th grade biology teachers and students at SMA Negeri 1 Kota Jambi, it is known that animal kingdom material is complex, so it requires media to help teachers convey an overview of the material and attract students' attention to learning. In addition, it is necessary to provide media that can help students understand the concept of animal kingdom material more easily. Most students are interested in motion graphics media because the media is in the form of animation-based videos. Therefore, researchers developed motion graphics learning media as a supporting medium in animal kingdom learning.

After the define stage is implemented, the next stage is the design stage. The design stage begins with script writing, narration recording, storyboard making, illustrating and animating. Script containing the concept of animal kingdom is written using Google Docs. After that, the narration recording was made based on the script using Audacity software. Then, the storyboard was made using Adobe Illustrator CC 2021 software. Based on the storyboard, illustrations were made using Adobe Illustrator CC 2021 software to be animated at the animating stage using Adobe After Effects CC 2021 software. The final result of this design stage is motion graphics learning media for 10th grade animal kingdom material in the form of an animated video in MP4 format. The following is a learning media design that has been made.
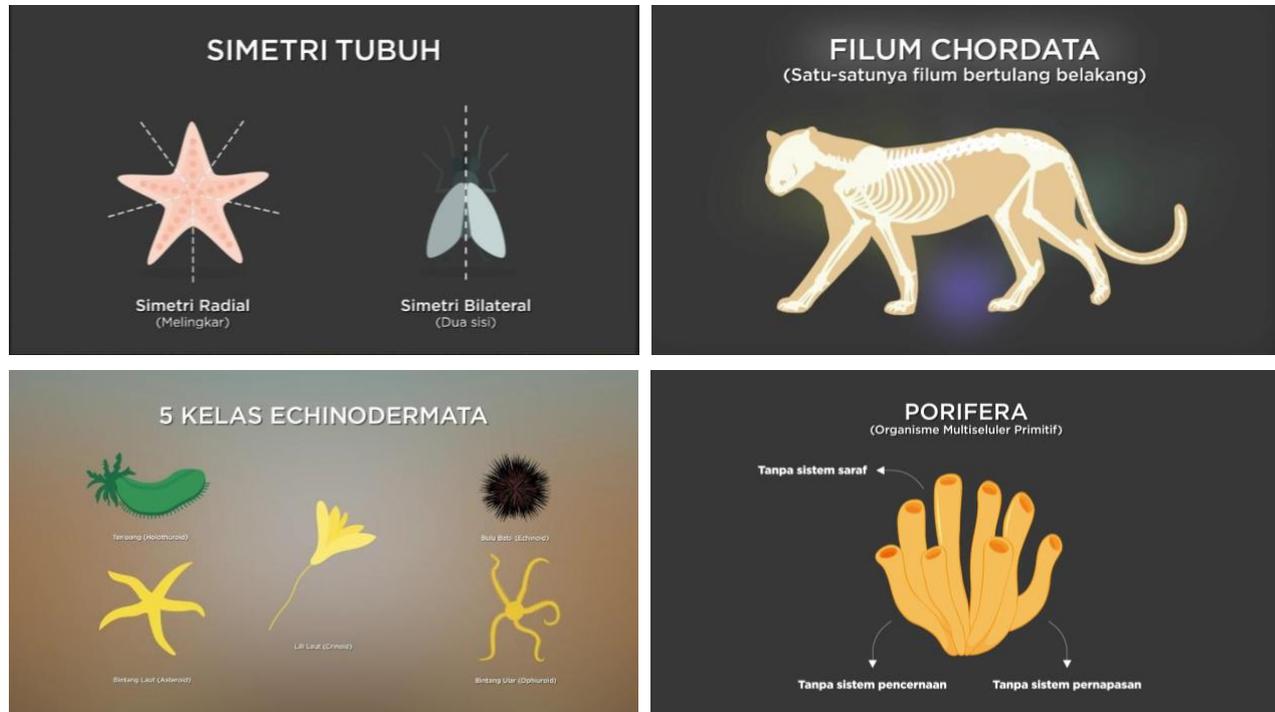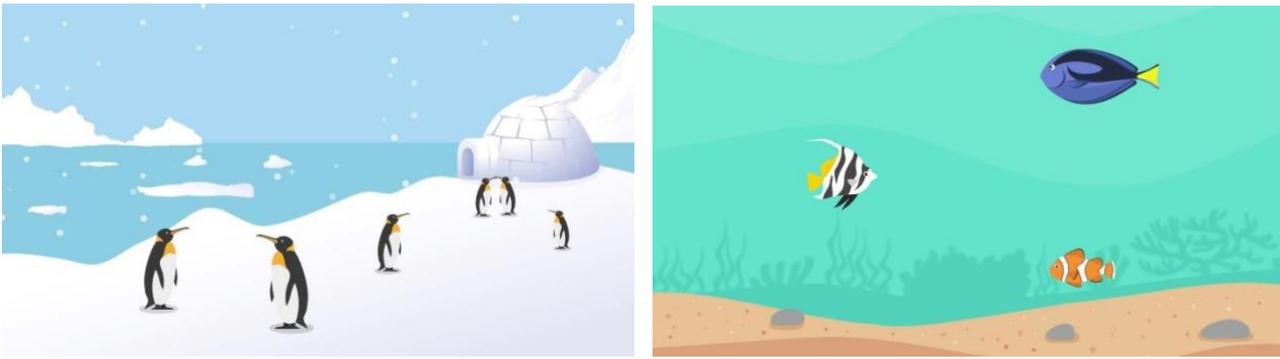
Figure 2. Display on learning media

The next stage is the development stage. At this stage, a feasibility test is carried out on the product that being developed. Based on the results of the material validation in the first phase, a feasibility percentage of 70% was obtained. It required additions and improvements based on the comments and suggestions of the material validator. After completing the revision of the product, a second phase of validation was carried out and obtained a feasibility percentage of 88%. Based on the comments and suggestions of the material validator, the product was declared eligible for testing. Based on both material validation phases, it can be concluded that the validation process shows an increase in each phase.

After the material validation, the next stage is media validation. Based on the results of media validation in the first phase, a feasibility percentage of 70,8% was obtained. It required improvements based on the comments and suggestions of the media validator. After completing the revision of the product, a second phase of validation was carried out and obtained a feasibility percentage of 87,6%. Based on the comments and suggestions of the material validator, the product was declared eligible for testing. Based on both material validation phases, it can be concluded that the validation process shows an increase in each phase.

Table 1
The result of material validation and media validation

	Assessment Aspects	Phase I	Phase II	Escalation
Validation	Material	70,0%	88,0%	18,0%
	Media	70,8%	87,6%	16,8%

Based on the data analysis that has been done, it is known that the final results of the validation of the material and media aspects are 88% and 87.6%. The final results of the material and media validation assessment showed a very good category, so that the product developed was feasible to be used in learning. Based on the assessment of the validator team, Motion Graphic media can be used as a supporting medium in learning. In addition, the teacher assessments, small group test and field test, resulting percentages of 94.7%, 94.4% and 93.3% with very good categories. This shows that the developed motion graphics learning media is feasible to be used in animal kingdom learning.
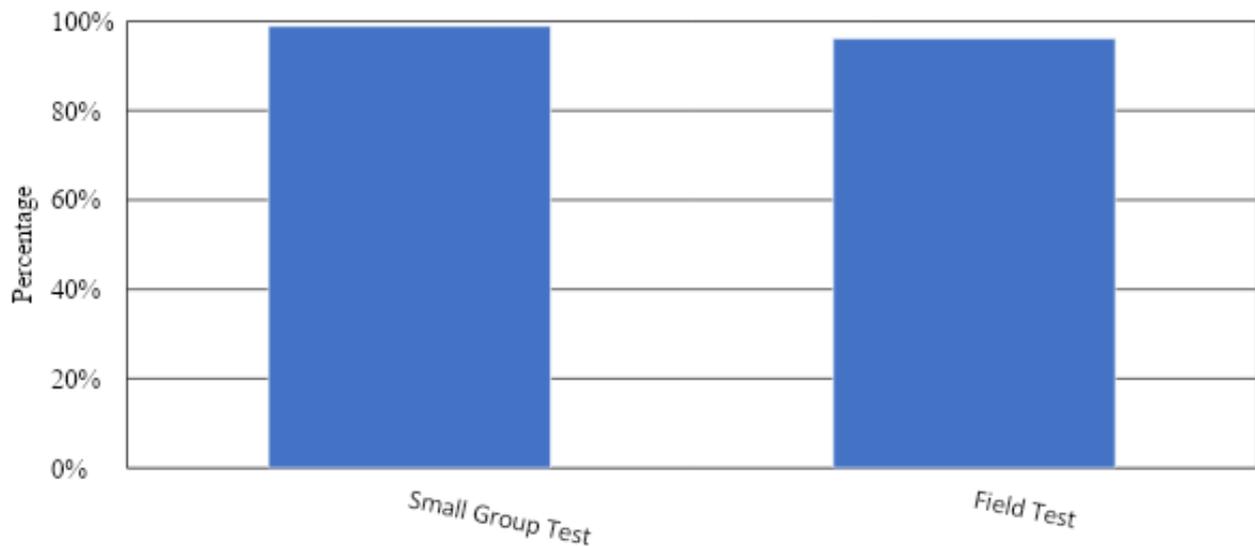
Figure 3. Validation and Test Result

Based on a literature study conducted by (Saputra & Wibawa, 2020), it was concluded that motion graphics learning media directly had a positive impact on student scores. This conclusion is quite relevant to the results of the students' questionnaire answers that motion graphics learning media can increase students' insight into animalia material. This can be shown in the following graph:
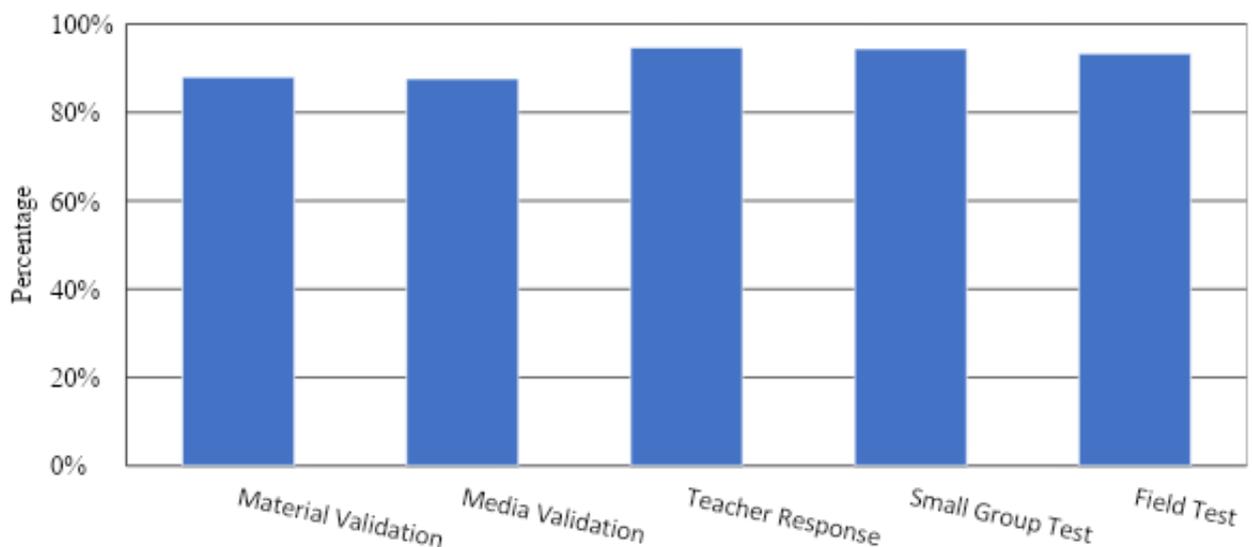

Figure 4. Product Advantage Aspect Responses by Students

Research by (Syah & Harsono, 2020) supports that motion graphics learning media can improve student learning outcomes. This is evidenced by the increase in the average pre-test and post-test scores in the experimental class by 27.5 points, from 53.53 points to 81.03 points. Meanwhile, in the control class that did not use motion graphics as learning media, there was only an increase of 6.81 points, from 54.41 points to 61.22 points. This proves that motion graphics learning media has a positive effect on student learning outcomes.

Research by (Hapsari, Hanif, Gunarhadi, & Roemintoyo, 2019) states that motion graphics media can be an alternative solution to the limitations that exist in textbooks (print) and other visual media. (Berney dan Bétrancourt, 2016) also stated that animation was significantly more effective than still images (static) in learning factual, conceptual and cognitive knowledge such as remembering,

understanding and applying. This supports that the developed motion graphics media can help students learn the concept of animal kingdom material.

The results of research on the development of Motion Graphics learning media by (Efendi, Adi, & Sulthoni, 2020) also show that the motion graphics learning media that have been developed are categorized as effective for use in learning. This is stated based on the acquisition of the learning outcomes test (post-test) from 43 students of SDN Pandanrejo 1 who achieved the overall minimum completeness criteria with a percentage of 81.39%. In this study, Motion Graphics media was developed for science subjects for class V Elementary School, while motion graphics media developed by researchers was for biology subjects, especially animal kingdom material for 10th grade.

Research by (Lidi & H. Daud, 2019) reveals that the use of animated media can also improve student learning outcomes and motivation in basic biology courses for genetic material. This is relevant to the media product developed in this study, namely motion graphics for animal kingdom material. In another sense, it can be proven that the use of media products similar to motion graphics can have a positive impact on learning. According to (Rani & Wusqo, 2021), the problem-based motion graphic video media used can also train students' high-order thinking skills with a percentage of 68% in the good category. Problem-based motion graphic video media is used to train collaboration skills to get a percentage above 62.50% in the very good and good categories. Therefore, the researcher hopes that the developed motion graphics media can also be useful for teachers and students in animal kingdom material when used in future learning.

According to (Thomas & Israel, 2014), the use of multimedia teaching via cartoon and animation teaching is an innovative approach for teaching science subject. This method improves the teaching and learning of science subject in schools since students studying science subject performed poorly in their external examination. In an attempt to curb this ugly trend of student failure in science in secondary school, the use of animation would enable the students to retrieve or recall the previously learnt subject quickly and thereby enhance their fortune in teaching and learning science subject. These approach can be effective additions to regular science instruction and can help students visualize unseen phenomena, develop scientific language, improve understanding of the scientific process and contribute to the development of scientific thinking

Based on research conducted by (Mahendra, 2021), motion graphics provide information or explanation of material from a subject matter, where the motion graphics are in the form of moving images, besides that motion graphics are made using 2D objects that move (animative) so that they can add more interesting content from a lecture material. According to (Saputri et al., 2018), learning activities using media can also increase students' motivation because of their interest in learning media that can provide text, images, video, audio and animation. This combination can be an effective learning tool for students. The more senses used in receiving and processing information, the more information will be received and remembered in memory. Media not only makes it easier for students to learn but also aims to provide various facilities for learning methods. Learners have different learning styles, some learn faster through visual media, while others learn through audio media, print media, audio-visual media and so on. Learning media is a solution to overcome the different learning styles of students.

CONCLUSION

The conclusion drawn from this study are the product is developed using a 4D model through the stages of defining, designing, developing and deploying. The material validator evaluates the product twice and the final percentage result is 88% with a very good category. The media validator made an assessment twice and the final percentage result was 87.6% with a very good category. The result of the percentage of teacher assessment of the product is 94.7% with a very good category, so it can be well received by the teacher. The results of the small group test and field test are 94.4% and 93.3% with very good categories, so that the developed product can be well received by students. Further research is suggested to deepen the concept of animal kingdom material, so that the developed media can present more detailed and complex information. Future researchers should better in mastering the development of motion graphics media, so that the product development process can run more efficiently and produce higher quality products.

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