



DEVELOPMENT OF MOTION GRAPHIC ANIMATION WITH THE INTEGRATION OF GUIDED CHARACTERS IN PHOTOSYNTHESIS MATERIALS FOR STUDENTS

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Abstract

This research aims to produce Motion Graphic Animation with Guided Character Integration that is feasible as a support for learning science subjects in the Photosynthesis material. The guided characters used in this animation serve as a guide that helps students understand the concept of photosynthesis more easily through the cartoon characters shown. This research was carried out in grade VIII of Frateran Celaket Catholic Junior High School in Malang. This research is a Research and Development (R&D) research. This research refers to the Sadiman development model, which includes several steps, namely identification of needs, formulation of goals, formulation of materials, formulation of success measuring tools, writing media scripts, trials, revisions, and media production. The types of data used in this study are qualitative data through the responses and suggestions of media experts, material experts, and student responses, and quantitative data through the results of questionnaires filled in by media experts, material experts, and students. The results of the study show that motion graphic animation with the integration of guided characters in photosynthesis material is considered feasible for use in learning. Thus, this motion graphic animation can be used as an effective learning medium.

Keywords: Animation; Motion Graphic; Guided Character; Photosynthesis; JUNIOR

1. Introduction

In the current era of Education 4.0, the use of technology in the field of education has developed so rapidly. Teachers are expected to have four core competencies that include pedagogical, professional, personality, and social aspects. In the learning process, teachers are not only a source of learning, but also play a role as facilitators who guide their students to achieve learning targets (Ellerani, 2020) One of the very important elements in the learning process is the use of media. The learning process in schools is not only limited to the use of print media or textbooks, but can also utilize technology in the form of learning media. The use of this technology aims to provide practicality and convenience for students in improving their knowledge, cognitive comprehension, and learning outcomes .

Based on an interview with a Science Subject Teacher at SMPK Frateran Celaket 21 Malang, it was explained that the use of learning media in the classroom tends to be limited to Package Books and PowerPoint Slideshows. Although these media have become an important part of the learning process, there are limitations in the visualization of the material because they are only static. This can cause students' perception of the material to be less in accordance with what is presented. It is important to recognize that increasingly advanced technological developments offer a variety of new opportunities in the delivery of learning materials. Especially on the topic of photosynthesis which is a direct

recommendation from science teachers where there is a need for qualified media to explain photosynthesis well, visualization of these complex processes can be more interesting and easy through the use of technology. Therefore, efforts are needed to improve the delivery of material by utilizing available technology.

The use of valid and innovative learning media is the key to increasing students' motivation and interest in learning. Various types of learning media have been developed, ranging from print media to audio-visual media, with the aim of facilitating the learning process and enriching students' learning experiences (Clark & Mayer, 2023). Motion graphics is one of the audio-visual media that combines moving visual elements, such as animation, moving text, and other visual effects, to convey a message or story (Johnson et al., 2020). According to the results of research by Ibrahim et al. (2020), the use of motion graphics in learning can improve students' understanding of the material being taught, because interesting and dynamic visualizations help students more easily remember and understand complex information. The novelty in this study lies in the development of motion graphic animation media that does not only display attractive visuals. The motion graphics developed integrate guided characters, which are the addition of animated characters that function as guides or guides in the learning process. These characters not only enrich the visual aspect, but also act as a narrator who effectively conveys information, helping to explain complex concepts in a way that is easier for the audience to understand (Johnson, 2022). With the guided character as the narrator, students' understanding of the learning material becomes simpler and easier to digest.

Motion graphic is a form of visual art that combines elements of graphic design, animation, and audio. Motion graphics are a very effective tool in learning because they are able to present information visually in an interesting and dynamic way. By using dynamic animations and engaging graphics, motion graphics can help students understand abstract or complex concepts more easily (Stuart, Brown, & Donnelly, 2021). Motion graphics is generally a combination of design pieces based on visual media that combine the language of film with graphic design, such as incorporating different elements such as 2D or 3D design, animation, video, illustration, photography, and music. This includes typography and graphics that can be seen as titles for movies, television program openers, bumpers, and graphic elements that appear on television.

The integration of guided characters in motion graphics refers to fictional characters that are presented as visual guides or narrators in the context of a story or concept that is conveyed in a structured manner. These characters not only serve as visual supporting elements, but also play a central role in guiding the audience through complex or abstract information in an engaging and easy-to-understand way (Khan, 2022). They are often designed with striking attributes, such as contrasting colors, striking animation styles, or strong personalities, which effectively focus the audience's attention on the message they want to convey. John Maeda (2021), guided characters can take various creative forms, ranging from representations of humans, animals, fantasy creatures, to customized animated objects as a vital tool to visualize abstract concepts or complex information in a more concrete and engaging way.

Based on the above explanation, the researcher is interested in developing motion graphic animation media with the integration of guided characters so that students can get a more innovative and interesting visual approach during the learning process. With the integration of guided characters, which function as guides or guides in the learning process, it is hoped that it can help explain difficult concepts in a way that is easier for the audience to understand.

2. Method

This research is classified as research and development (research and development), this research is specialized for research that produces a product through systematic and accountable procedures and frameworks. The product developed is a motion graphic animation with guided character integration. According to Seels and Richey (2019), development research that concentrates on product manufacturing is a method that focuses on the creation of new products or learning materials that have structured development attributes and processes.

The development model used in this study is the Sadiman development model. The Sadiman model was chosen in this research and development because it is one of the most commonly used approaches in creating video media because it has a structured planning and a systematic framework.

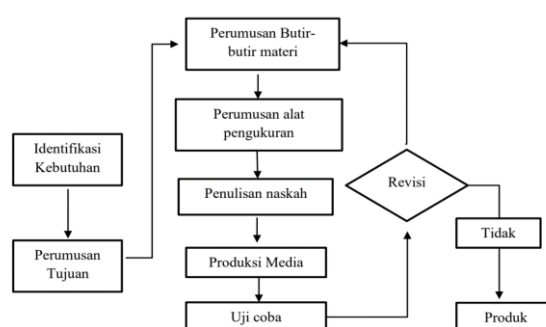


Figure 1 Sadiman Development Model (2009)

Sadiman's development model goes through 8 stages of activities, namely analyzing the needs and characteristics of students, formulating *instructional objectives*, formulating material items, developing success measurement tools, writing media scripts, production, tests/trials, and final products (Sadiman, 2011, p. 100).

At the needs analysis stage, it is carried out in the form of direct observation and interviews. Based on the results of interviews with science teachers at SMPK Frateran Celaket 21 Malang, it was explained that the use of learning media in the classroom tends to be limited to Package Books and PowerPoint Slideshows. Although these media have become an important part of the learning process, there are limitations in the visualization of the material because they are only static. This can cause students' perception of the material to be less in accordance with what is presented. It is important to recognize that increasingly advanced technological developments offer a variety of new opportunities in the delivery of learning materials.

The second stage is the formulation of goals. The formulation of learning objectives is prepared based on the Learning Implementation Plan (RPP) in the school so that the goals are relevant and measurable.

The third stage is the formulation of material items. After the goal is set, the researcher prepares learning materials that will be delivered through the media. This material is arranged systematically and logically, so that it is relevant to the learning objectives and easy for students to understand.

The fourth stage is the formulation of a success measuring tool. At this stage, the researcher formulates a measuring tool or evaluation instrument to measure the feasibility of the developed learning media. The main focus is to know how appropriate the media is to be used in the context of learning.

The fifth stage is the writing of media scripts. Media Script Writing is used as a guideline when creating media. In this study, the manuscript prepared includes a storyboard and narrative that serves as a reference in the creation of the developed learning media.

The sixth stage is production which is divided into 3 steps. The first step involves creating an illustration/animation asset created using *Adobe Illustrator software*. The next step is *dubbing* done by *the dubber* then the results are edited using *Adobe Audition software*. The last step is to create animations that are done using *Adobe After Effect software*.

The seventh stage is the trial. The media that has been produced must then be evaluated through trials to determine the feasibility of the product. The trial consisted of a feasibility test by media experts & material experts and a student response test which was divided into individuals (2 students), small groups (4 students) and large group tests (25 students) class VIII C SMPK Frateran Celaket 21 Malang.

The last stage is revision. Based on the results of the trial, the researcher then revised the learning media. The revision stage will be carried out if the media has shortcomings or has not met the expected criteria according to the Media Experts & Material Experts.

In this study, there are two data produced, namely quantitative and qualitative data. Quantitative data was obtained from filling out questionnaires and qualitative data was obtained from interviews, suggestions and input from validators. The scale used is the Likert scale. The 1-5 point rating scale modification model applied in this study was (5) strongly agree, (4) agree, (3) somewhat agree, (2) disagree, (1) disagree. The results of expert and user responses were analyzed qualitatively and quantitatively descriptively.

3. Results and Discussion

3.1 Result

The result of this development is a motion graphic animation product that has a duration of 3 minutes. These animations are created using a combination of *Adobe Illustrator* and *Adobe After Effects* software, which allows for the creation of attractive and dynamic visuals. The main goal of this motion graphic animation is to turn complex concepts

into simpler and more interesting, so as to maximize students' understanding during the learning process.



Figure 2 Motion Graphic Animation

In addition, this motion graphic animation is also equipped with guided character integration that features cartoon characters who act as narrators while attracting the attention of students who have the name *Ivy*. Not only do these guided characters provide a narrative that helps explain important concepts clearly and easily understand, but they are also designed to captivate students' attention through engaging character designs. This makes learning more effective and enjoyable for students.

IVY CHARACTER DESIGN

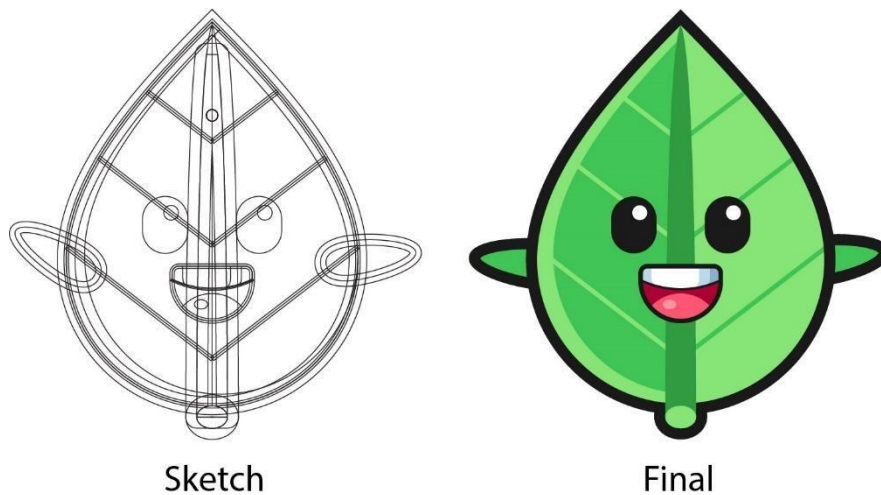


Figure 3 Design Characters

The product was developed and validated to material experts, media experts and tested for students of grade VIII C SMPK Frateran Celaket 21 Malang which was divided through individual, small group and large group trials. The validation/trial process uses a likert scale

questionnaire with feasibility level criteria according to Arikunto, if the value is in the percentage range of 80%-100%, it is classified as a suitable criterion.

Table 1. Media Expert Validation Results

Aspects	Average
Design	94,8%
Display	98%
Language	100%
Accessibility	96,5%
Total	97,3%

Based on the results of validation by media experts, a total percentage value of 97.3% was obtained. Detailed data from the questionnaire given to media experts showed that the design aspect obtained a score of 94.8%; display aspect reaches 98%; the language aspect gets a score of 100%; and the accessibility aspect obtained 96.5%. Overall, media experts consider that the media developed has met good standards and is declared feasible.

Table 2. Material Expert Validation Results

Aspects	Average
Presentation of Materials	90%
Display	100%
Language	95%
Media Suitability	88,2%
Total	93,3%

Based on the material experts, a total 93.3% was obtained. questionnaire given to that the aspect of

obtained a score of 90%; the aspect of display reaches 100%; the language aspect gets a score of 95%; and the aspect of media suitability obtained 88.2%. Overall, media experts consider that the media developed has met good standards and is declared feasible.

results of validation by percentage value of Detailed data from the media experts showed presenting the material

Table 3. Student Response Test (Individual)

Aspects	Average
Material	85,5%
Display	86%
Language	86,5%
Accessibility	86%
Total	86%

Based on the results of the joint response test of 2 students of class VIII C SMPK Frateran Celaket 21 Malang, a total percentage value of 86% was obtained. Detailed data from the questionnaire in the individual trial showed that the material aspect obtained a

score of 85.5%; the display aspect reached 86%; the language aspect obtained a score of 86.5%; and the accessibility aspect obtained 86%. Overall, media experts consider that the media developed has met good standards and is declared feasible.

Table 3. Student Response Test (Small Group)

Aspects	Average
Material	90%
Display	93%
Language	94%
Accessibility	90%
Total	92,5%

Based on the results of the joint response test of 4 students of class VIII C SMPK Frateran Celaket 21 Malang, a total percentage value of 92.5% was obtained. Detailed data from the questionnaire in the small group trial showed that the material aspect obtained a score of 90%; the aspect of display reaches 93%; the language aspect received a score of 94%; and the accessibility aspect obtained 90%. Overall, media experts consider that the media developed has met good standards and is declared feasible.

Table 4. Student Response Test (Large Group)

Aspects	Average
Material	89%
Display	92%
Language	93%
Accessibility	92,8%
Total	91,7%

Based on the results of the joint response test of 25 students of class VIII C SMPK Frateran Celaket 21 Malang, a total percentage value of 91.7% was obtained. Detailed data from the questionnaire in the small group trial showed that the material aspect obtained a score of 89%; the aspect of display reaches 92%; the language aspect gets a score of 93%; and the accessibility aspect obtained 92.8%. Overall, media experts consider that the media developed has met good standards and is declared feasible.

The development of motion graphic animation with the integration of guided characters is said to be able to support teachers in learning and teaching activities in the classroom. This statement can be judged from the results of data on the validity or feasibility of media to be used in the learning process. According to Yunita (2019), the high level of

validity shows that the multimedia developed has uniqueness, and novelty that is different from the previous multimedia.

3.2 Discussion

Advances in the field of education. In this digital era, the use of technology to support the teaching and learning process is becoming increasingly important. One form of learning media that is increasingly used is motion graphic animation. This medium has great potential to increase student engagement as well as facilitate the understanding of difficult concepts. By using dynamic visualization and structured narratives, motion graphic animation can help students to understand complex information more easily and fun. This is in line with research conducted by Takashi et al. (2020), which showed that motion graphic animation is effective in improving students' understanding through the visualization of difficult concepts.

The use of motion graphic animation also allows the repetition of material according to the needs of students. According to Kaur et al. (2021), one of the advantages of this medium is its flexibility, where students can re-access the material that has been learned at any time according to their respective learning pace. This provides a more immersive and personalized learning experience. In addition, motion graphic animation also allows simulation of situations that are difficult to replicate in a traditional classroom environment, so students can experience and understand those situations virtually. Suharyanto and Adele (2016) emphasized that the quality of learning supported by advanced technology such as motion graphics can have a significant impact on the learning process. They found that motion graphics were able to stimulate students' creativity levels and increase their motivation to learn. These findings are in line with the results of this study, which suggests that motion graphic animation can increase student engagement in a similar way.

In this study, the media used is motion graphic animation with the integration of guided characters as a learning support for photosynthesis materials. The guided characters shown in this animation serve as a guide for students to more easily understand the concept of photosynthesis. The cartoon characters used not only attract the attention of students, but also make it easier to convey complex information to be simpler and easier to understand. The use of guided characters in animation is based on the theory of Attention Economy put forward by Davenport and Beck (2001), which states that attention is a very valuable resource in the learning process. With guided characters, these animations are designed to capture students' attention continuously through a combination of dynamic visuals and communicative characters. Thus, in addition to helping in delivering the material, guided characters also ensure that students stay engaged and focused during the learning process.

(Safitri & Suparwoto, 2018) provides strong support for the use of motion graphic-based animation in learning. In their research, it was found that students who learned using interactive animation had a better understanding of biological material compared to those who learned using conventional methods. This suggests that the visualization provided by animation is capable of replacing, or even surpassing, the effectiveness of traditional teaching methods that typically rely on text and verbal explanations. In this study, the concept of photosynthesis that is usually considered difficult by students can be conveyed

in a more understandable way through animation, which displays the process of photosynthesis in a sequential and interesting manner.

Research conducted by (Rohimah, 2018) also shows that the use of visual-based learning media, including animation, can improve students' understanding of abstract concepts. Rohimah emphasized the importance of engaging design and effective visualization in increasing students' interest and engagement in the learning process. These findings are particularly relevant to current research, where motion graphic animation with guided characters is not only designed to convey information, but also to grab students' attention through engaging design and fun interactions. Thus, this media not only serves as a teaching tool, but also as a means to motivate students to be more active in the learning process.

Furthermore, research conducted by Karaca and Aksoy (2019) emphasizes the importance of student involvement in the learning process through the use of interactive media. They found that students who were actively involved in the learning process, such as through interaction with animation, tended to have better learning outcomes compared to those who only received information passively. In the context of this study, the use of guided characters in animation serves as an interactive element that not only helps convey the material, but also encourages students to interact with the material being studied. This is in accordance with the principles of constructivism which emphasizes the importance of an active learning experience and student involvement in the learning process.

In this study, the results obtained show that motion graphic animation with guided characters is very effective in improving students' understanding of the concept of photosynthesis. This is in line with the previous research already mentioned, where the use of animation-based and visual media consistently showed an improvement in student understanding. However, the study also adds a new dimension with the integration of guided characters, which provides additional guidance and ensures that students not only understand the material, but also stay engaged throughout the learning process. This guided character plays an important role in maintaining students' attention, which according to the theory of Attention Economy (Davenport and Beck, 2001), is one of the key factors in the success of the learning process.

In addition, this study also underlines the importance of validating learning media before it is widely implemented. Validation by media experts, subject matter experts and student responses, as carried out in this study, provides assurance that the media used is not only effective pedagogically, but also well received by the end user, in this case students. In this study, the validation process shows that motion graphic animation with guided characters is suitable for use in learning according to the results of the questionnaire that has been tested.

The combination of learning that combines a face-to-face model in the classroom with the use of motion graphics has been proven to significantly improve students' learning experience. Motion graphics have shown positive changes in student enthusiasm and engagement, as expressed by Smith and Anderson (2015), who noted an increase in students' motivation and interest in learning through this medium. The use of motion graphics offers an interactive and entertaining learning freedom, which can create a more

interesting and enjoyable learning environment (Johnson D, 2017). Lee and Kim (2018) added that the quality of learning that utilizes motion graphics can have a very significant impact, with noticeable changes in the level of students' creativity in thinking. Brown and Green (2019) also found that the use of motion graphics can significantly increase students' creative thinking skills. Based on the results of validation tests and student feedback on the product, it can be concluded that the integration of motion graphics with guided characters has proven to be feasible and effective for use in the learning process, offering innovative solutions to improve student engagement and understanding of complex material.

4. Conclusion

Based on the results of validation from media and material experts, motion graphic animation with guided character integration is declared valid both in terms of visuals and content, and is suitable for use in the learning process in the classroom. Student responses show that the developed media is interesting, effective and efficient to be used in the learning process. Guided characters have been shown to play an important role in capturing students' attention and keeping them engaged throughout the learning process. Thus, this learning medium is not only pedagogically effective but also well received by students. Future research should include the application of motion graphic animation to various other learning topics, with content and visual adjustments that are more responsive to students' diverse learning styles. In addition, it is also necessary to consider the use of 3D animation technology to keep up with increasingly advanced technological developments. Thus, this media has greater potential to become a broader teaching tool and have a significant impact in various educational contexts.

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