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# Development of Contextual Visual Media in Increasing the Scientific Literacy of Middle School/ MTs Students

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***Abstract***: *The low level of students' scientific literacy abilities can be caused by learning habits that are still conventional. Developing digital-based learning media is a good learning media to use in learning in the era of the industrial revolution 4.0 and is believed to be capable to increase students' scientific literacy. The aim of this research is to develop contextual visual media that can increase students' scientific literacy. The method used in this research uses the ADDIE model developed by Dick and Carry. The results of the research is in the form of contextual visual media which was developed in five stages, namely analysis was carried out by observing and interviewing school principals and subject teachers, design was carried out by making stories boards, at the development stages validation was carried out by material experts and learning design experts , implementation was carried out in the experimental class, and the evaluation stages was carried out by improving the visual media developed according to input from the validator team. The validity test results are in the very good category, so the visual media developed is suitable for use in research. Based on the t test results of 0.001, these results indicate that the hypothesis is accepted, so it can be concluded that there is an increase in scientific literacy after learning activities using the developed contextual visual media.*

***Keywords:*** *Contextual; Literacy; Media; Science; Visual.*

## 1. INTRODUCTION

Science learning contains many abstract concepts that are outside everyday experiences in the teaching and learning process. As a result, teachers find it difficult to convey the material and students find it difficult to understand it. Media can present information visually, auditorily and kinesthetically, making abstract things real. When students see how concepts are relevant and used in everyday life, they are more likely to remember and apply that knowledge in the future. This is due to the relationship between abstract concepts and real-world applications. When students can relate new ideas to everyday examples and experiences, they are more likely to organize their knowledge in a way that makes it easier for them to understand it well and apply it in new situations (Ambrose *et al*., 2010).

In the era of industrial revolution 4.0, digital technology-based learning media is the best. The contextual approach is a good learning approach for science content (Sukmadewi & Suniasih, 2022). It is hoped that student learning outcomes will be better with a contextual approach and the use of learning media (Wijayanti & Mawardi, 2022). Darmawan (2020) states that students who use a contextual learning approach with the help of visual media have the possibility of better science learning outcomes compared to students who use a conventional learning approach. (Muliastrini, 2020).

literacy is defined by PISA as the ability to use scientific knowledge, identify questions, understand nature and how human activities influence it, and draw conclusions based on evidence to make decisions. According to the

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OECD, scientific literacy includes not only knowledge of scientific facts but also the ability to think critically, solve problems, and understand the scientific method. Scientific literacy also includes the ability to think critically, solve problems, and understand scientific methods (OECD, 2019). According to Norris and Pillip (2003), students' lack of scientific literacy skills can be caused by conventional science learning habits, which ignore the importance of the ability to read and write science as a competency that students must have. According to Rahayu (2015), because students usually only fill in tables given by the teacher, their ability to understand and interpret graphs and tables is also limited. Apart from that students are not used to scientific literacy tests (Fuadi *et al*., 2020).

The low scientific literacy abilities of students in class VII MTs Negeri 7 Majalengka are caused by the lack of application of interactive and digital-based learning methods. Most teachers still rely on lecture methods and use textbooks as the main source, which results in students being less actively involved in the learning process. This can be seen from the low science test scores and the low level of understanding of scientific concepts that are relevant to everyday life. In addition, the inability of students to connect lesson material with natural phenomena around them shows that the learning process carried out is still unable to attract students' interest and stimulate curiosity. To attract students' interest in learning, one solution is to use teaching media that is attractive to students by using contextual visual media. So, research is needed that develops contextual visual media in the form of learning videos, which are able to attract students' interest in participating in learning, and make students focus on learning, which ultimately can improve students' understanding abilities so that they are expected to be able to increase students' scientific literacy. Learning videos have great potential in improving students' scientific literacy, because they can present information visually and contextually, which is easier to understand and attracts students' attention. According to Zulkarnain *et al*. (2020), the use of learning videos can significantly increase students' learning motivation, which in turn can have a positive effect on their scientific literacy achievements. In addition, Starr *et al*. (2022) also stated that there is a reciprocal relationship between motivation and scientific literacy, so that increasing learning motivation through interesting media, such as videos, can be an effective strategy to improve students' scientific literacy skills.

Thus, the development of contextual visual media in the form of learning videos that are relevant to students' lives is expected to be a solution to overcome the low scientific literacy skills at MTs Negeri 7 Majalengka. Learning videos that contain contextual and interesting elements can help students to more easily understand scientific concepts, connect them with natural phenomena around them, and increase their interest and motivation in learning. Therefore, this study was conducted to develop contextual visual media in the form of learning videos that can improve the scientific literacy of grade VII students of MTs Negeri 7 Majalengka.

The aim of this development research is to create contextual visual media in the form of learning videos which are expected to increase students' scientific literacy. With this learning video, it makes it easier for students to access media anytime and anywhere using their cellphones. This research connects the use of contextual visual media with scientific literacy, where previous researchers focused on the use of visual media for understanding concepts or student motivation in general.

## 2. RESEARCH METHODS

The method used in developing contextual visual media uses the ADDIE model developed by Dick and Carry (1996) as an effort to design learning media (Gingga Prananda *et al*., 2020). ADDIE is an abbreviation for Analysis, Design, Development, Implementation and Evaluations whose models and developments are more complete than 4D models. This strategy is a process used to develop and validate educational products. The results of this research are in the form of learning video products.

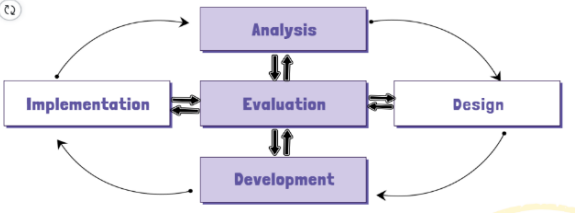

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**Figure 1.** ADDIE Development Model

A. Analysis
At this stage the researcher analyzes the need for development of a new learning model and identifies and searches for data needed in developing learning media. The development of learning media must begin with problems with the learning media previously used. Researchers collected information by observing schools and interviewing school principals and science subject teachers, as well as analyzing journals in developing contextual-based videos.

B. Design
At the design stage of the learning media product that will be used, namely using Canva and Kinemaster for more effective teaching and can improve student learning outcomes. By adding several icons or images, videos and animations to the learning media which can make them more interested in learning and able to visualize it. Researchers also create product designs as follows: 1). Media design begins with preparing a learning media flow which functions as a guide to the flow chart so that product development can take the form of structured learning media; 2). Create a comprehensive product design at the beginning in the form of a storyboard which is used as a design for the product to be made. After creating a storyboard, you will get a conceptual framework for the learning media that will be developed.

C. Development
development stage is the process of developing the design into the Canva learning media application. After the design has been entered into the Canva application, then use the Kinemaster application to record and complete the animation, and it has been designed again properly, then the next step is to create a validation instrument for material experts and media experts. The most important thing in this development is the important goal that must be achieved, namely, producing or revising teaching materials, videos, animations, texts, audio visuals, according to what will be used to achieve the learning objectives that have been formulated.

D. Implementation
At this stage, visual media as a development product has been declared valid by the validator so that a simple trial can be carried out on 25 class VII students. This is done to determine the level of success in using visual media. This visual media is suitable for use if the user's assessment results reach the good category. However, if the assessment results are not appropriate then improvements can be made according to the suggestions given by the respondents. After the media was broadcast, students were asked to fill out a questionnaire. The next stage visual media will be implemented in class VII A as the experimental class while VII D becomes the control class. Based on the experimental class, treatment was given in the form of learning using the Group Investigation learning model assisted by visual media, while in the control class learning uses the Group Investigation learning model without the assistance of visual media. This was done to see the level of difference in the results of increasing students' motivation and scientific literacy.

E. Evaluation
The Evaluation Stage is the final step in the ADDIE learning system design model to provide value to the development of media in learning. This evaluation stage was used in every previous development. This evaluation uses formative evaluation with the aim of revising the media development process such as expert suggestions and comments judgment which is used as a guide in making revisions or improvements so that the product created can be suitable for use in the learning process.

The instruments used in this research are:

1) Interview guide
This research uses a data collection method using an interview guide, which was carried out as a preliminary research method. The interviews conducted as part of the research were unstructured interviews.

2) Guide Validation assessment sheet guide
Guide to the form of research validation in the form of a questionnaire using a Likert scale based on the grid developed. This type of measurement scale gets a clear answer,

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namely a value on a scale of one to five. Likert scale measurements are carried out by providing a checklist with columns one to five which are developed in accordance with the assessment criteria. The guidelines on the validation sheet are used to determine the suitability of the learning media being developed. If the average reaches greater than or equal to 3.00 (≥ 3.00) from the range 1 – 5 then visual media is considered appropriate (Falah & Rusydiyah, 2022).

3) Test sheet
Based on research, an initial test (pretest) and final test (post-test) were carried out. Pretest is a test carried out before the learning process. This test is intended to find out whether students have mastered the material provided. Post-test is a test given after the teaching and learning process is complete. The aim of this test is to understand the level of progress students have made in their learning outcomes.

4) Questionnaire sheet
A questionnaire sheet was used to determine student responses to the application of the developed contextual visual media.

Instrument testing in research aims to understand whether the measuring instruments that have been created are reliable and valid or not. This test includes a reliability test and a validity test of the question items. Validity testing uses the *Pearson Product formula Moments* while reliability testing in this study was measured using the Cronbach coefficient alpha using Microsoft Excel and SPSS software. After the research is carried out, the data that has been obtained is then analyzed using several steps, namely testing prerequisite analysis and hypothesis testing. Test the prerequisites for analysis by carrying out a normality test and homogeneity test, then a t test is carried out to test the comparative hypothesis of two samples, namely the control class and the experimental class.

## 3. RESULTS AND DISCUSSION

The results of research and development are contextual visual media products in the form of learning videos, which were developed using the ADDIE development model which includes five stages, namely *analysis*, *design*, *development*, *implementation*, *evaluation*.

The needs analysis stage was carried out by conducting observations and interviews with the principal and science subject teachers, with the aim of finding out *information* about teachers, students and the teaching and learning process that is usually carried out and the implementation of learning using visual media. Based on the results of the interview, it turned out that the problems faced by teachers in the learning process included incomplete facilities and infrastructure, including many classrooms that were not equipped with adequate technological devices, for example projectors that could be used to support the use of digital-based learning media; The learning process is passive, this tends to make students quickly feel bored and lose interest, which ultimately has an impact on their low understanding of science material, this shows an urgent need for the implementation of more innovative and interactive methods, such as the use of digital media that can make learning more interesting and enjoyable for students; One of the main problems faced in the learning process is the minimal use of contextual visual media in science learning. Although some teachers acknowledge the importance of using visual media to improve student understanding, they face limitations in terms of resources and knowledge to develop effective learning media. Teachers tend to be limited to the use of textbooks and blackboards as the main media, so that the learning process becomes less dynamic and inadequate to arouse students' curiosity. It is highly recommended to apply contextual-based audio-visual media because it can increase students' enthusiasm and desire to learn (Sukmadewi & Suniasih, 2022).

Based on the analysis stage, then the second stage is carried out, namely the design stage, with the following steps, namely preparing media flow and creating product designs in the form of story boards. Media flow is a flow or sequence that describes how video content will be presented to students, components of media flow include opening, material discussion, visualization, case examples, and conclusions. A storyboard is a visual representation of the storyline in a learning video that helps detail the visual and audio elements that will be used at each stage of the

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video, as well as how the transition between parts will occur.

The third stage is development, at this stage is the stage of refining the product resulting from the development that has gone through the revision stage through several experts. This development uses two applications, namely the Canva and Kinemaster applications. The previously created design is developed using the Canva application by entering text, images and animations. Furthermore, the visual media that has been developed with the Canva application is edited and added media components such as text, images, animations, videos, letter recordings and adding music, using the Kinemaster application. There were 2 visual media broadcasts, namely the first visual media with a duration of 1 minute 13 seconds and the second visual media with a duration of 19 minutes 31 seconds. After the learning video media is complete, the next step is validation of the visual media product resulting from the development carried out by material experts and learning design experts. After passing validation by material experts and learning design experts. The validation results carried out by material experts obtained an average percentage of 80% with a good category based on the Likert scale. The validation results carried out by learning design experts obtained an average percentage of 88% with a very good category based on the results of the Likert scale analysis. Based on the validation value from the two experts, an average of 84% was obtained with a very good category based on the results of the Likert scale analysis, so it can be concluded that the contextual visual media resulting from the development is suitable for use in research.

The implementation stage is carried out before A series of research was carried out through product trial activities carried out on 25 experimental class students. The results of student responses to contextual visual media can be seen in the graph.

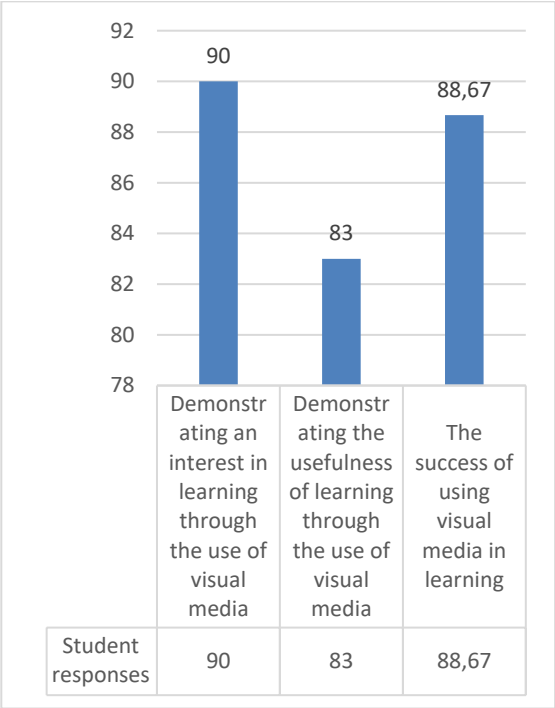


**Figure 2.** Graph of Questionnaire Results of Student Responses to Contextual Visual Media

Based on the data diagram from the questionnaire results of student responses to contextual visual media, the average score for the indicator showing interest in learning using visual media was 90, the average score for the indicator showing the usefulness of learning using visual media was 83, and for the average The average indicator of success in using visual media for learning received a score of 88.67. Based on the results of the questionnaire table above, of the 25 student responses, there were those who gave positive responses and there were also students who gave negative responses. The results of product trials that have been carried out have received a very good response as seen from the results of testing with 10 instruments. Student responses have an average positive percentage of 87.50% in the very good category based on the Likert scale.

Literacy is measured using an instrument in the form of questions included in the pretest and post-test, a total of 7 questions whose validity and reliability have been tested using the SPSS application. Based on the table above, the Sig value for questions number 1 to number 7 has a sig of less than 0.05, which means that all question

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instruments are valid and can be used as data collection tools. A research instrument is said to be reliable or trustworthy if its Cronbach's value Alpha is greater than 0.60 (Ghozali, 2016). SPSS calculation results Cronbach's values Alpha is 0.693, which means the instrument is reliable or can be trusted to collect data. The following are the comparison results *of the pretest* and *post-test* in the control class and the experimental class based on all scientific literacy indicators.

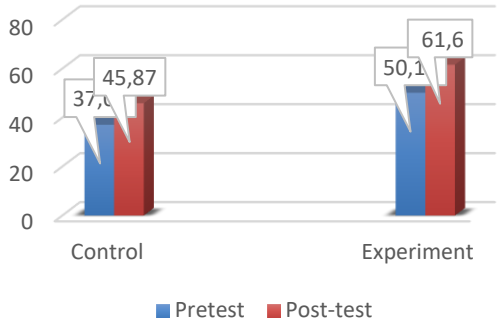


**Figure 3** Comparison graph *of pretest* and post-test on scientific literacy

Based on the diagram above, comparing pretest scores with post-test scores on scientific literacy, the average score in the control class for pretest results was 37.07 and the post-test score was 45.87, for the average score in the experimental class for pretest results. as much as 50.13 and the average score on the post-test results was 61.6.

Before carrying out statistical test analysis, prerequisite tests must be carried out in the form of normality tests and homogeneity tests first. Data from pretest and post-test results from class VII D as the control class and class VII A as the experimental class were then tested for normality, homogeneity and t test using the SPSS application. The results of scientific literacy calculations are presented in table 1.

**Table 1.** Calculation of Scientific Literacy in Control Class and Experimental Class

| The calculation results | | Extraordinary Load | |
|---|---|---|---|
| | | Control | Experiment |
| Number of samples (n) | | 25 | 25 |
| Normality test | Pretest | 0.05 > 0.05 | 0.391 > 0.05 |
| | Post-test | 0.322 > 0.05 | 0.098 > 0.05 |
| Homogeneity Test | | 0.928 > 0.05 | |
| t test | | 0.001 < 0.05 | |

Normality testing in this research was carried out to test the normality of control and experimental class data. This test used is the Shapiro-Wilk test with the criterion that if the test significance value is > 0.05, the data has a normal distribution. Based on the output produced from the normality test, significance data was obtained for the Shapiro-Wilk with a value in the experimental class for the pretest of 0.391 and for the post-test results of 0.098 while the value in the control class for the pretest results was 0.05 and 0.322 for the post-test results. Because the resulting significance value is more than 0.05, it can be stated that the data used in the research is normally distributed.

After testing for normality, it was continued with a homogeneity test of post-test data variance from the experimental class and control class using the SPSS application. Based on the results of the homogeneity test, the Based significance value is obtained on the mean is 0.928. This means that the significance value is more than 0.05, so it can be concluded that the variance of the experimental class post-test data and the control class post-test data is homogeneously distributed.

After obtaining normal and homogeneous data, further data analysis was carried out to test the hypothesis, namely the t-test using SPSS. Based on the data in the table above, the results of the t test obtained a two-sided p significance for the pretest and post-test for the experimental class of 0.001, where this result shows that the hypothesis is accepted, because the t test results <0.05. So, it can be concluded that there is an increase in scientific literacy after using contextual visual media in learning about Indonesia's ecology and biodiversity.

At the final evaluation stage, the authors added sections suggested by the validation team.

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The results of the analysis which have been described in the research results section, show that contextual visual media for class VII students at MTs Negeri 7 Majalengka can increase students' scientific literacy, this can be seen based on the results of expert validation which can be categorized as visual media as very suitable for use, as well as the results hypothesis testing for scientific literacy which can be concluded that there is an increase in scientific literacy after using contextual visual media in learning ecology and biodiversity in Indonesia.

The characteristics of visual media that are relevant to everyday life enable students to more easily understand and relate scientific concepts to everyday situations to increase students' interest in learning and improve their abilities in scientific literacy. For example, research conducted at Madrasah Ibtidaiyah AL- Muhtadien Bitung found that the use of visual media can help teachers convey lessons and increase students' interest in learning (Rojanah, 2021). Other research finds that the use of visual media can improve students' abilities in scientific literacy (Ahmad *et al*., 2022).

In teaching, the use of contextual visual media has many advantages and has a positive impact on the learning process in terms of understanding, motivation and scientific literacy. Contextual visual media can bring classroom topics to life and make abstract or theoretical content more concrete and accessible. Effective visual media can provide context and examples that make abstract concepts more concrete, easy to understand, and easy to remember. Picture illustrations can help students understand and remember text better, while effective visual media can provide visual context that makes abstract concepts more concrete, easy to understand, and easy to remember (Carney & Levin, 2002).

Videos can accommodate a variety of learning preferences, supporting visual, auditory, and kinesthetic learners. Additionally, by presenting information in a multimedia format, videos can help students process and retain information in a way that is most appropriate for them (Bhatti *et al*., 2017). Contextual visual media that uses images and animation can increase students' interest in learning and improve students' scientific literacy skills (Rojanah, 2021).

## 4. CONCLUSION

The contextual visual media developed has characteristics that are relevant to everyday life, making it easier for students to understand and relate scientific concepts to everyday situations to increase students' interest in learning and improve their abilities in scientific literacy. Contextual visual media developed in the form of learning videos that can accommodate various learning preferences, supporting visual, auditory and kinesthetic learners.

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