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DEVELOPMENT OF AUDIO VISUAL LEARNING MEDIA ON THE MATERIAL OF BLACK GLUTINOUS RICE GROWTH (*Oryza sativa* L var.glutinous) IN VITRO AT SMK AL HIDAYAH WULUHAN

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ABSTRACT

Education in Indonesia is always influenced by the developments of the times, and education in Indonesia is following the digitalization era. Where every school requires teachers as educators to be able to develop learning media in the schools. The problem faced by students is the lack of learning facilities, which prevents them from clearly understanding the process of In Vitro tissue culture. This certainly demotivates and bores the students during classroom learning. Supportive learning media allows students to absorb the content better. This study of audio-visual learning media uses the Research of Development methodology, and the research model used is the Plomp 2013 development model, which includes three steps: the analysis phase, the prototype design and development phase, and the evaluation phase. The evaluation phase includes material expert validation, media expert validation, and practical worksheets, i.e. questionnaires given to teachers and students. The results of the study on the development of audiovisual learning media achieved an average score of 84% in the category of "very effective" in material expert validation and an average score of 83% in the category of "very effective" in media validation. In the practical tests for teachers, the experts' average score was 89.3% ("very practical"), and in the readability tests for students, the average score was 84% ("very practical").

INTRODUCTION

The world of education in Indonesia always follows the era of the times. Currently, education follows the digital era where every school requires teachers as educators to develop the learning media used. This is so that students can easily learn the material delivered by the teacher. In teaching and learning activities, there are materials or important points that can make teaching and learning activities more fun, interesting, interactive, and inspiring (Zahwa & Syafi'i, 2022).

The school, as a place in the teaching and learning process, has a very important role in the implementation of learning. However, not all schools have facilities that can support the achievement of one material in the learning process. Teachers as educators have the opportunity to develop learning media as a substitute for less supportive school facilities, and the ability of teachers to develop media is needed so that the classroom atmosphere becomes active and fun (Fauziah & Ninawati, 2022).

Learning media developed vary, offering a rich tapestry of options. These include teaching aids, visual media, audio media, and audio-visual media. Each of these can be used to stimulate the thoughts, feelings, and abilities of students to understand the material presented by the teacher (Nomleni & Manu, 2018).

Learning media has an important role in the success of the learning process of students at school. Learning media helps students develop their imagination, and audio-visual media is used to help students who have difficulty understanding the material. Audio-visual media helps teachers convey information so that it is easily understood by students (Fridayanti et al., 2022). Students prefer learning resources that are interesting and interactive and equipped with colour images, audio, video and interactive quizzes (Aziza, 2021).

The learning process for students in schools today still applies a conventional learning model where the teacher conveys material through lectures, delivering material using only books, ppt slides, and class discussions, as well as giving assignments or exercises that must be completed by students independently, schools need media as a tool for students to more easily understand the material delivered by the teacher (Ananda, 2018). In this study, black glutinous rice was the object of the learning video. This is because Black glutinous rice requires a longer harvest time compared to regular rice, so Indonesian farmers rarely plant and cultivate it. This makes the price of black glutinous

rice higher than regular rice. Therefore, an innovation in modern agriculture using tissue culture for black glutinous rice has been developed, with the hope that it will assist farmers in cultivating and planting black glutinous rice.

Learning media in schools can help teachers deliver learning materials properly, stimulating students' attention. Engaging teaching methods can help students better understand the material presented by the teacher (Nomleni et al., 2023).

Of course, this can make students less enthusiastic about participating in the learning process at school. This can be seen in observations at SMK Al Hidayah Wuluhan on the subject of tissue culture, where students tend to be passive in discussions and lack enthusiasm when the material is delivered.

Based on the results of these observations, it was revealed that learning that only uses the lecture method of delivering material using books, powerpoint slides, and class discussions is less effective because students are easily bored in class, so the classroom atmosphere is less conducive. So, efforts are needed to increase students' interest in learning in the classroom through the application of interesting, innovative, and efficient learning media. One of the efforts to make students excited about learning at school is to develop learning media. Based on the problems mentioned above, this research aims to develop audio-visual learning media to improve students' interest in learning.

MATERIALS AND METHODS

This type of research is Research of Development (R&D), which is a type of research used to produce a product. The resulting product is then tested for validity by material and media experts, as well as readability tests through teacher responses and small-scale student responses.

This research was developed using the Plomp model (Plomp 2013). The Plomp model was chosen because the Plomp model is more flexible and flexible; the steps in the Plomp model can be adjusted to the characteristics of the research; the Plomp research steps consist of:

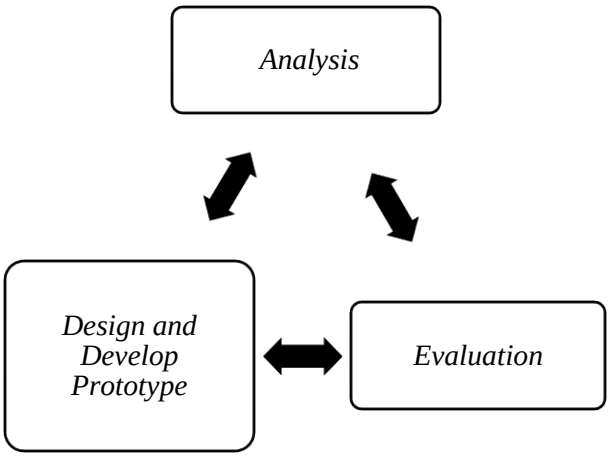

Figure 1: Steps of the Plomp model

The analysis phase of the research is a comprehensive process that meticulously identifies students' needs and problems. This phase involves a thorough review of the school curriculum, ensuring that the development of audiovisual learning media is firmly rooted in the latest curriculum, i.e., the original curriculum.

The media design and development phase aims to create and design the product. This step includes media selection and learning strategies to determine which media fit the characteristics of the students. The initial design of these learning media is in the form of an audiovisual media prototype product based on in vitro grown material from black glutinous rice (*Oryza sativa* L var. glutinous). This educational video (audiovisual) is created using the Canvas application. The evaluation phase aims to test the effectiveness and practicality of the audiovisual media by evaluating the format or form and improving the material accordingly. The data source for this study was obtained using questionnaires and interviews. The data source for this study was called the respondents, and the respondents for this study were media experts, material experts, teachers, and students. In this research and development of audiovisual learning media, a methodology that combines quantitative and qualitative descriptive analysis is used. The quantitative descriptive analysis method is performed in a way that conducts this validation analysis to determine the feasibility or validity of the developed audiovisual media.

A validation analysis will be carried out to determine the feasibility or appropriateness of the developed audiovisual media using questionnaires and instruments from material experts and media specialists. Furthermore, a usability analysis will be carried out using usability and readability tests on a small sample of

three students consisting of low, medium and high. The research and development of this audio-visual learning media was carried out on May 18- 08 june, 2024, at Smk Al-Hidayah Wuluhan. The assessment criteria used in assessing this questionnaire were adapted from the Linkert scale (Singarimbun et al. 2006). The results of the analysis of teacher responses and learner responses can be used as a basis for making decisions.

Table 1. Assessment Guidelines for Validation Test and Practicality Test.

Score	Indicator
5	Very good/very interesting/very appropriate/very clear/very appropriate
4	Good/interesting /clear/decent
3	Fair/suitable enough / clear enough
2	Less good/less attractive/less clear /less feasible
1	Very bad/not interesting/ not suitable / not clear / not feasible

Source: adapted from (Singarimbun, et al 2006)

Data obtained from the validation results of media experts and material experts, as well as teacher responses and learner responses, were analyzed using the percentage formula as follows:

$$P = \frac{\Sigma Xi}{\Sigma X} \times 100$$

(Akbar, 2013)

Meanwhile, to calculate the average percentage of all validators, the formula is used as follows:

$$P = \frac{\Sigma p}{n}$$

The categories of calculation results obtained can be seen in **Table 2** below:

Value Range (%)	Category	Decision
$81{,}25 \leq \times < 100$	Very Valid/Practical	No need to revise, Product is ready to be used for learning purposes
$62{,}5 \leq \times < 81{,}25$	Valid / Practical	No need to revise, the product can be continued by adding something that is lacking but not too much, as well as conducting closed considerations.
$43{,}5 \leq \times < 62{,}5$	Less Valid/Practical	Needs to be revised, the product needs to be revised by re-examining carefully and looking for weaknesses.
$25 \leq \times < 43{,}75$	Not Valid/Practical	Major revision, the product needs to be revised massively and fundamentally.

Source: adapted from (Akbar, 2013)

Qualitative descriptive analysis involves collecting information in the form of suggestions, criticism, input, and improvements provided by media experts, material experts, teacher responses, and student responses.

This section contains the methodology used to achieve the research objectives: research design, population and sample, research steps, instruments used, research tools, and materials.

RESULTS AND DISCUSSION

Teachers who deliver learning content need media so that the message can be conveyed correctly. Innovation in Information and Communication Technology (ICT) has brought massive influences that direct the use of digital media, but many teachers nationwide are still not skilled in using digital media. This happens because of many factors, such as the complexity of the media itself, like video editing or interactive software, or because the infrastructure is not always available in some schools, for instance, a lack of computers or internet access (Rusid et al., 2024). So, this audio-visual-based learning media was made. This audio-visual learning media development research uses the Plomp 2013 development model, while the research method uses Research of Development (R&D). Plomp's development model consists of 3 stages, namely: Analysis Stage, Prototype Design and Development Stage, Prototype Development Stage.

Analysis Stage

The analysis stage is carried out to obtain an overview of the initial conditions of students, teachers, curriculum, and classroom teaching. This stage is crucial as it not only reveals the problems and needs in this study, but also relies on the expertise and insights of educators, researchers, and policymakers like you.

Design and Prototype Development Stage

The design stage aims to prepare and develop the design of learning devices in the form of animated videos. At this stage, it will be determined how the media will be designed as a whole. The video shooting process was carried out at the Biotechnology Laboratory of the Center For Development Of Advance Sciences And Technology (CDAST), Jember State University. The laboratory's state-of-the-art equipment and

facilities were instrumental in ensuring high-quality video production. The video was taken using a cellphone camera.

Media Selection and Learning Strategy

Media selection is a dynamic process that constantly adapts to students' interest in learning and adjusts to their abilities. The resulting product is a moving animated video that uses audio to explain the material presented, ensuring it remains engaging and relevant.

Display Design

The creation of the audiovisual media (Learning Video) involves a specific process. First, the Capcut application is used to combine pre-recorded video pieces. Then, the Voice Changer application is used to add sound, adjusting the pitch and tone to suit the content. Finally, the Canva application is used to add characters and animations, enhancing the visual appeal of the video.

Figure 2: Display Design

Prototype Development

The prototype development stage is a crucial step that produces an initial design of the audio-visual learning media, specifically focusing on the growth of the black glutinous rice plant (*Oryza sativa L var.glutinosa*).

Evaluation Stage

The evaluation stage is the stage of validation and practicality of audiovisual media. This stage aims to obtain suggestions, input, opinions, and evaluations of the learning videos that have been developed.

Revision

The revision stage is an iterative process that occurs after the learning media is developed and evaluated. Based on the evaluation results, revisions are made to the product produced according to the suggestions given by the validator. After several revisions, the validator returned to validate this audio-visual learning media.

Validation

Material experts carried out the first validation test, ensuring the content's accuracy and relevance. Media experts carried out the second validation test, focusing on the effectiveness of the audio-visual elements. Mr. Bahrudin Salman, S.Psi, conducted a practicality test of learning media, assessing its usability in a classroom setting. Student readability test learning media was tested on a small scale with a limited number of students, ensuring it is accessible and engaging. The results of validator validation can be seen in the table below:

Table 3. Results of Validation by Material Experts

No	Aspects	Percentage	Category
1.	Feasibility of material content	87%	Very valid
2.	Language	80%	Valid
3.	Systematics Presentation	86%	Very valid
	Average	84%	Very valid

Our validation process, conducted by material experts, was thorough and comprehensive. The material content was found to be 87% feasible, the language quality was rated at 80%, and the presentation systematics scored 86%. These results led to an average validity of 84% and a categorization of 'very valid ', making the learning media a reliable and recommended resource for testing and use in learning.

Table 4. Results of Validation by Media Experts

No	Aspects	Percentage	Category
1.	Feasibility of material content	80%	Valid
2.	Language	88%	Very Valid
3.	Systematics Presentation	80%	Very valid
	Average	83%	Very valid

Based on the data obtained from validation by material experts, namely, the feasibility of material content obtained a percentage of 80%, language obtained a percentage of 88%, and presentation systematics obtained a percentage of 80%, thus obtaining an average value of 83% and getting a category (very valid) so that learning media is worth testing and using in learning.

Table 5. Results of Practicality Test by Teachers

No	Aspects	Percentage	Category
1.	Visual / display	80%	Praktical
2.	Systematics Presentation	92%	Very practical
3.	Benefit aspect	90%	Very practical
	Average	89,3%	Very practical

The results of the table above demonstrate the high effectiveness of audio-visual learning media for teaching In Vitro tissue culture. The percentage values obtained from the trial on tissue culture subject teachers were based on three aspects: visual aspect (80%), systematic presentation (92%), and benefits aspect (96%). The average results from these three aspects, namely 89.3%, fall in the category of 'very valid ', implying that audio-visual learning media can be a valuable tool for educators in the field of biology and tissue culture.

Table 6. Practicality Test Results by Students

No	Name of student	Percentage	Category
1.	Ahmad Khubi Khoiri	89%	Very practical
2.	Husein Musorif	82%	Very practical
3.	M.Rizqi	80%	Practical
	Average	**84%**	Very practical

Based on the results of the practicality test by students, the audio-visual learning media has proven to be highly practical. Student 1 scored 89%, falling into the 'very practical' category, while student 2 scored 82% and student 3 scored 80%, both in the 'very practical' and 'useful' categories respectively. The average score of 84% in the 'very practical' category indicates the high practicality of this learning media, making it a viable tool for schools.

Media learning has the power to ignite students' interest and increase their engagement in the learning process. As demonstrated in the study on In Vitro tissue culture material (Widhayanti & Abduh, 2021), an interesting learning environment can foster a conducive classroom atmosphere, leading to more effective learning outcomes (Rosyid Mahmudi & Alena, 2023).

Audio-visual media is often used in learning in the classroom because audiovisual media can visualize the material very well, so the delivery of the material is easier to understand (Hadi, 2020). Audio-visual media involves two senses in humans, namely, the sense of sight and the sense of hearing. Through audio-visual learning media, it is hoped that students can further increase their interest in learning tissue culture materials so that they can increase their knowledge (Wulandari et al., 2023).

This development research has resulted in a product in the form of innovatively and creatively designed educational videos that stimulate students' interest in learning. The developed learning media have the advantage that they can be accessed by students both online and offline. Another advantage is that the presence of these learning media increases students' interest in learning about tissue culture materials (Nurfadhillah et al., 2021).

These learning media, accessible online or offline via devices such as mobile phones, laptops, and PCs, are designed to be user-friendly for students, teachers, and the general public. They are versatile, facilitating both group and individual learning, and are particularly beneficial for those interested in studying in vitro tissue culture processes.

Based on the results of the validity test and practicality test of audio-visual learning media, the percentage result was 84% in the category (very valid) for material experts, and the percentage was 83% in the category (very valid for media experts), for the practicality test by teachers, the percentage was 89.3. % in the (very practical) category, and for the practicality test, the students got a percentage of 84% in the (very practical) category. So, it can be concluded that the learning media developed is suitable for use as learning media in schools. It is hoped that the results of this research will provide benefits for various parties, including students, teachers, institutions, and further research.

CONCLUSION

Based on the results of research and development of audio-visual media, it can be concluded that learning using audio-visual media can increase students' interest in learning tissue culture materials. The positive student engagement observed, marked by their active participation and enthusiasm, is a hopeful sign for the future of education. It is hoped that the results of this research will encourage and bring hope to various parties, including students, teachers, institutions, and further study.

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