

Use of Learning Video Media in Biology Education Subjects

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Abstract

Video-based learning has great potential for the future of learning, including biology lessons. This research aims to evaluate the use and development of videos in biology education along with the challenges that will be faced in the future in video learning media in biology education. This research uses a qualitative approach with descriptive methods. The results show that the use of videos can effectively improve student achievement and encourage them to participate actively. The video format can be adjusted to suit learning needs, but educators need skills to optimize advantages and overcome disadvantages. Biology learning videos have been widely developed and proven to be valid. Learning methods such as Problem Based Learning and Guided Inquiry can be integrated to provide a more focused learning structure. Future challenges faced in learning with video media include accurate and relevant content, accessibility and availability of infrastructure, interactivity and student involvement, production quality and creativity, suitability to student diversity needs, evaluation and measurement of effectiveness, continuous maintenance and updating, and aspects ethics and privacy.

Keywords: Media, Learning Videos, Biology Learning, Students.

A. Introduction

The goal of national education is an important foundation in developing the quality of Indonesian people, which is reflected in every educational unit. Focusing on national character education is essential for forming quality individuals (Iriany, 2017). In the context of biology lessons, developing national character can be done by instilling analytical skills, both inductively and deductively. This ability is specifically associated with critical abilities, which are an important foundation for the formation of people's character (Sari, 2016).

Critical abilities, such as analysis, induction, and deduction, are key in the current era, allowing someone to think logically and draw the right conclusions. Therefore, fostering critical abilities through biology lessons not only supports national education goals, but also makes a real contribution in forming individuals who are able to think critically and rationally (Setyaningrum & Husamah, 2020). Thus, biology lessons not only function as learning scientific concepts, but also as a vehicle for forming students' character and preparing them to become citizens with integrity and able to contribute positively to society (Rustaman, 2011).

Minister of Education and Culture Regulation Number 22 of 2016 concerning Primary and Secondary Education Process Standards emphasizes the importance of holding an interactive, inspiring, fun and challenging learning process (Hidayar & Kosasih, 2019). The aim is to motivate students to participate actively and provide sufficient space for initiative, creativity and independence in accordance with their talents, interests and physical and psychological development (Wahyuni, 2022). Thus, the learning approach promoted by this regulation aims to create a learning environment that is conducive to developing students' potential.

In this context, it is important to understand that the success of the learning process does not only depend on the delivery of material, but also on the ability to arouse students' interest in learning activities (Zaifullah et al, 2021). Growing interest can be a driver for active student involvement in the teaching and learning process and has the potential to improve their learning outcomes. Therefore, teachers and educators need to develop learning strategies that are able to stimulate student interest, thereby creating a learning atmosphere that is dynamic, enjoyable, and motivates each individual to actively participate in the educational process (Iskandar, 2019).

Learning can be defined as a process that creates an environment that encourages the learning process, which in turn is expected to change student behavior (Ramdhani, 2014). In recent developments, there is an interesting trend in the world of education, namely the implementation of video-based learning environments (Burhayani et al, 2023). This method has spread widely at various levels of education, from elementary to tertiary education, and involves various subjects, including biology learning.

According to Jayawardana (2002), in an effort to improve optimal Biology learning outcomes, Biology education practitioners have introduced and implemented various learning strategies that are in

accordance with the characteristics of the Biology subject. From several learning strategies put forward by Biology education experts, it can be seen that the selection and application of the strategies used has shifted from those that prioritize providing information (providing Biology concepts) to learning strategies that prioritize thinking skills used to acquire and use Biology concepts (Setiawan, 2019).

Video-based learning environments offer a dynamic and engaging approach, harnessing the power of visuals to convey information and concepts. These advantages make it an effective learning tool, especially in scientific disciplines such as biology which often involve complex concepts (Yendrita & Syafitri, 2019). Videos can present content in a more understandable way, facilitating understanding of abstract concepts through clear visual representation. The use of video-based learning environments also creates flexibility, allowing access to learning materials anytime and anywhere. This can increase students' active participation, facilitate the independent learning process, and trigger their interest in learning material, including biology subjects (Maryanti & Kurniawan, 2018).

Syaflin (2022) explains that the use of video-based learning environments shows enormous potential in directing the future evolution of learning. Halawa (2021) highlights that video not only continues to grow, but also provides an effective platform for students. In this context, video in learning provides the ability to overcome real-world obstacles and explore the potential provided by digital spaces. In addition, videos support student-focused learning, both in the classroom and in the home environment.

Video integration in online learning systems, such as various types of Learning Management Systems and e-classes, provides flexibility for students (Dewi et al, 2021). They can access videos and use a variety of additional services such as online chat rooms, forums, or even video conferencing to interact with teachers. According to Sari (2016), the combination of video with other learning services has great potential to create an integrated online learning space for students.

In addition, the role of video in changing the concept of teaching from a didactic approach to constructivist learning is becoming increasingly important (Al-Tabany, 2017). Video's ability to visualize material helps effectively convey dynamic information. Thus, the use of video in learning not only offers flexibility and interactivity, but also opens the door to a paradigm shift in teaching and learning approaches.

This research aims to explore the use of biology learning videos as support for classroom and independent learning. It is hoped that this research will improve the quality of learning in the classroom by providing variety through dynamic visual formats, as well as facilitating independent learning with easy access to material. The benefits involve increasing student participation, developing more effective learning materials, and measuring overall effectiveness. It is hoped that this research will provide a valuable contribution to improving students' biology learning experiences in various learning contexts.

B. Method

This research is descriptive in nature with a qualitative approach, in accordance with the postpositivist view explained by Sugiyono (2015). Qualitative methods are used to examine the condition of natural objects, where the researcher functions as the main instrument. Data collection techniques are carried out triangulated or combined, data analysis is inductive/qualitative, and the research focus places more emphasis on meaning than generalization. The aim of this qualitative descriptive research is to describe, depict, explain, explain and answer in detail the problems related to the use of learning video media in biology subjects. Humans as research instruments in a qualitative context, with written results in the form of words or statements in accordance with the observed reality. This research chose a qualitative descriptive method because its focus was on exploring the use of instructional video media in the context of biology learning. Information is obtained through literature study, which includes various literature such as books, research articles and media reports.

C. Results And Discussion

1. Use of Learning Video Media in

The use of videos in biology learning has penetrated all levels of education, including elementary schools which focus on understanding natural science, including simple biological concepts. Video as a learning tool opens up opportunities to present material visually, visualize biological concepts, and present natural phenomena in a more realistic way. This can help students, even at elementary school level, to more easily understand the material and develop an interest in biology from an early age (Silaban et al, 2018).

Several studies highlight the effectiveness of using video media in biology learning at the elementary school level. In this context, several researchers state that the use of videos is more effective in increasing students' science learning activities and outcomes compared to the use of image media. By presenting biology material via video, students can engage more actively, gain deeper understanding, and build their critical skills (Aliyyah et al, 2021; Sunami & Aslam, 2021). Therefore, the application of videos

in biology learning in elementary schools is not only an effective learning tool, but also has a positive impact on the development of understanding of biological concepts at the initial education level.

At the junior high school level, research shows that there is a significant difference in biology learning achievement between learning that uses video media and learning without using video. The research results show a tendency for biology learning achievement to be in the very high category when video media is used as a learning aid. This indicates that the use of videos in biology learning can have a positive impact on student achievement at the junior high school level (Yunita & Wijayanti, 2017).

Furthermore, at the high school level, especially in research focused on cell and chromosome development, the effectiveness of using videos in biology learning is increasingly visible. The research results show that the use of videos can improve student learning outcomes in understanding material related to cell and chromosome development. Apart from that, the use of videos also encourages students to be actively involved in the learning process (Utami et al, 2020).

The use of video opens up opportunities to present better visualizations related to complex biological concepts. By presenting a clear and dynamic picture, students can more easily understand the material, build concepts, and relate them to real-world contexts. Therefore, the use of videos not only has an impact on improving student learning outcomes at the high school level, but also stimulates their active involvement in deeper exploration and understanding of biological material.

The use of videos in biology learning does not only apply at primary and secondary school levels, but has also spread to universities. This phenomenon is reinforced by the results of research conducted by Susilo & Widiya (2021) which states that the majority of students show an interest in using videos in learning, especially through the video-based learning approach. Observations of students show a high level of enthusiasm when videos are played by lecturers as part of the learning process.

The application of video-based learning at the tertiary level brings significant benefits. Apart from giving students easy access to biology learning materials anywhere and at any time, the use of videos also improves the quality of learning by providing a dynamic visual dimension. Students can more effectively understand biological concepts through the visualization provided by videos. In this context, accessing videos as learning materials can be used as a flexible reference source and supports students' independent learning activities. Thus, the use of videos in biology learning in higher education not only provides an innovative alternative, but also allows students to be actively involved in the learning process, optimize understanding of concepts, and increase engagement in learning material (Khairani et al, 2019).

Apart from in class, the use of videos can also be integrated as a practical medium in biology learning. This approach shows potential in improving student learning outcomes when compared to conventional learning strategies usually applied by teachers. Through video-based practicum media, students have the opportunity to experience the practicum process virtually, visualize experiments, and understand biological concepts in more depth (Setiawati et al, 2017).

The application of practical videos in learning not only provides an innovative alternative but also allows students to learn independently. Students can access practical videos anytime and anywhere, opening up space for learning outside the classroom environment. The ability to engage in virtual experiments spurs students to understand and apply biological concepts in a more active way. This not only increases students' understanding of the subject matter, but also forms independence and initiative in their learning. Thus, the use of practical videos can be considered a learning strategy that enriches students' learning experiences, bridges theory and practice, and stimulates their interest in biological sciences (Hendriyani & Novi, 2020).

Videos not only function as practical media, but can also be implemented as teaching materials for video-based biological experiments in the form of video-based laboratories. Especially at the high school level, this approach combines learning with kindergarten games for cell replication material. Through a video-based laboratory, students can access virtual cell replication experiment simulations, allowing them to understand and observe the process directly without having to involve physical equipment that may be difficult to access. This creative approach not only provides an innovative alternative in teaching biology, but also increases student interest by integrating game elements in experimental learning, thereby creating a more interactive and enjoyable learning environment (Jayanti et al, 2017).

The use of videos in the context of biology learning requires careful consideration to ensure their effectiveness. First, the selection of videos must pay attention to the characteristics of the biology material being taught and match it with the learning objectives. The selected video should be able to illustrate biological concepts clearly and be appropriate to the student's level of understanding. In addition, videos must be able to actively involve students in learning, not only as visual aids but also as a means to arouse their interest in the material. Second, the attractiveness of the video is very important. Interesting videos will motivate students to focus and provide strong reasons for them to complete learning tasks. The use of

creative design elements, engaging narrative, or dynamic visualization can increase a video's appeal. Student interest can be the key to the successful use of video in activating the learning process.

Furthermore, teachers have an important role as facilitators in the use of videos. The integrity of videos in learning can be improved through discussion and analysis together with students. Teachers can pause videos to discuss, ask reflective questions, and ensure students understand the concepts presented. This interaction provides an opportunity to bridge the link between video content and student understanding. Finally, the clarity and detail of the video also plays a crucial role. Videos should be able to detail biological events or phenomena clearly, helping students relate abstract concepts to real situations. This will enrich students' understanding and ensure that videos are not just a visual tool but also a source of substantive knowledge.

There are four conditions for productive video use: (1) the video content should not be too complete or in accordance with the student's wishes for investigation; (2) the level of difficulty of the video case must match what students already know; (3) the video should be watched in a structured manner, highlighting the role of the tutor or educator in helping students to focus their attention on certain things in the video; (4) the video must be short and unique because its structure must not be identical and it must not repeat what has been stated in other learning materials.

To ensure that the use of videos in biology learning can be productive and improve student learning outcomes, there are four conditions that need to be considered. First, the video content should not be too complete or in accordance with the student's desire to carry out the investigation. This aims to ensure that students remain actively involved in learning, explore further information, and not only rely on videos as the sole source. Second, the level of difficulty of the cases presented in the video should be in accordance with the knowledge that students already have. This aims to ensure that the material presented is accessible and understandable to students.

Furthermore, the use of videos must be done in a structured manner, emphasizing the role of the tutor or educator in guiding students to focus on certain things in the video. This structured approach helps students to focus on the key aspects to be conveyed, increases the effectiveness of learning, and prevents undesirable dispersion of attention. Finally, videos should be short and unique, avoiding identical structures and repetition of other learning material. In this way, students will remain interested and not feel bored, and can obtain new and different information from various learning sources.

By paying attention to these four conditions, the use of videos in biology learning can be an effective tool, encouraging student involvement and increasing their understanding of the learning material. As technology advances, understanding how to use video appropriately can be the key to maximizing the potential of multimedia learning in improving student learning outcomes.

2. Challenges in developing Biology learning video media in the future

The future development of biology learning video media faces several challenges that need to be overcome to ensure effectiveness and sustainability. Some of the main challenges include:

a) **Accurate and Relevant Content :**

Continuity of accuracy and relevance of content in the development of biology learning videos is a crucial challenge amidst the dynamics of rapid development of biological science. As biological knowledge continues to expand, there is an urgent need to regularly update video content to keep it in line with the latest scientific standards. This update not only involves the latest information, but also requires a deep understanding of the development of new concepts and findings in the biological sciences. Therefore, developers and educators must be committed to continuing to follow and respond to developments in biological science so that learning videos not only provide accurate information but are also relevant to the latest scientific advances, supporting students in understanding and applying biological knowledge in a broader context. .

b) **Infrastructure Accessibility and Availability**

The challenges of accessibility and infrastructure availability are the main obstacles in developing biology learning videos, especially in areas that experience limited internet access or technological devices. It is important to ensure that learning videos are designed taking these conditions into account so that they can be accessed by all students without exception. Strategic steps include selecting downloadable video formats for offline access, using data-friendly technology, and providing alternative access via various devices. In addition, collaboration with related parties, such as local governments or non-profit institutions, can be a proactive step in improving digital infrastructure in areas where it is still limited. In doing so, it is hoped that these efforts can bridge the accessibility division and ensure that biology learning videos can be an inclusive learning resource for all students, regardless of geographic location or technological limitations that may exist.

c) **Interactivity and Student Engagement**

Increasing the level of interactivity and student involvement in the use of biology learning videos is a challenge that requires a creative and structured approach. Video development should not be limited to presenting static information; instead, videos must be carefully designed to stimulate student interaction. This can be achieved by embedding interactive elements, such as reflective questions, exploratory tasks, or group discussions integrated directly into the video. The option to provide choices makes the student experience more personalized and increases its appeal. Additionally, utilizing online learning platforms to engage students in discussion forums, interactive quizzes, or collaborative assignments can be an effective strategy for increasing student engagement. By presenting learning videos that can trigger questions, discussions, and interactive assignments, biology learning can become more dynamic, arouse curiosity, and give students a more active role in understanding biological concepts.

d) **Production Quality and Creativity**

In the face of growing competition and changes in student tastes, maintaining the quality of biology learning video production and increasing creativity in presenting material is essential. High production quality involves the use of the latest equipment and technology, including clear shots, good audio, and attractive visual effects. Meanwhile, creativity in design and production techniques is key to maintaining student attraction. The use of animation, interactive graphics, and innovative directing styles can make videos more engaging and relevant. Attention to visual design, music selection, and pacing can also influence the level of student engagement. Thus, the development of biology learning videos must combine high production quality with creative elements that can stimulate student interest, making biology learning more interesting and effective in facing dynamic changes in the world of education.

e) **Suitability to Student Diversity Needs**

In developing biology learning videos, adapting to students' diversity needs is imperative. This includes recognition of different learning styles, varying levels of understanding, and heterogeneous cultural backgrounds of students. Learning videos need to be designed to be inclusive, considering this diversity as an aspect that enriches the learning experience. The use of various methods of conveying information, such as visual, auditory, or kinesthetic, can support varying learning styles. Selecting content that is accessible to varying levels of understanding and includes different cultural perspectives is key to creating videos that are relevant and meaningful for all students. Therefore, efforts to make biology learning videos inclusive will not only support understanding of biological concepts, but also promote the values of diversity and inclusivity in the classroom.

f) **Evaluation and Measurement of Effectiveness**

Determining appropriate evaluation and effectiveness measurement methods for biology instructional videos is a critical stage in ensuring a positive impact on student understanding. This involves developing assessment instruments that are appropriate to the desired learning objectives. Assessment instruments should cover various aspects, including conceptual understanding, analytical skills, and student engagement during and after watching the video. It is important to adapt evaluation methods to the diversity of students, considering individual learning styles and abilities. Additionally, assessments can also include student feedback to assess the extent to which the video helps them achieve learning goals. By ensuring that assessment instruments are appropriate to the learning context and student characteristics, we can ensure accurate evaluation of the effectiveness of biology learning videos and continuously improve their quality.

g) **Ongoing Maintenance and Updates**

Maintaining continuous maintenance and updating of biology learning videos is a crucial aspect in supporting the sustainability and relevance of the content. Continuous monitoring of scientific developments and student feedback is required to identify areas of necessary improvement or improvements. In addition, maintaining video compliance with technological developments is an important step in order to take advantage of the latest features and ensure video availability on various platforms. Collaboration with experts in biology and educational technology can help update content and ensure that videos meet current scientific standards. With effective maintenance and updating strategies, biology learning videos can continue to make a valuable contribution in supporting student learning in this ever-evolving era.

h) **Ethical and Privacy Aspects :**

Addressing issues related to ethics and privacy, especially in the context of the use of video in online learning, is a challenge that requires a careful approach. Ensuring data security and student privacy is a top priority in the development and use of biology learning video media. This requires implementing strict policies regarding the collection, storage and use of student data. Developers and educators must ensure that the online learning platforms used comply with applicable privacy and security standards. Education to students and parents is also needed to increase awareness of privacy and ethical issues related to the use

of video in learning. Thus, efforts to address these ethical and privacy issues can build student, parent, and teacher confidence in the use of biology instructional videos in online learning environments.

D. Conclusion

The development and implementation of learning video media in the context of biology learning brings a number of challenges and aspects that need to be considered. To increase its effectiveness, strategic steps and a sustainable approach are key. Issues such as content accuracy and relevance, accessibility, interactivity, production creativity, student diversity, evaluation, maintenance, and privacy security require in-depth attention. It is important to continually update video content to stay current with scientific developments in biology, while ensuring that the videos are accessible to a diverse group of students. Increasing interactivity in videos, through the development of interactive tasks and discussions, can increase student engagement and arouse their interest in learning biology. In addition, maintaining production quality and increasing creativity in presenting material is essential to attract students' attention amidst changing demands and tastes. Adjustments to student diversity, both in learning styles and cultural backgrounds, must also be accommodated in the development of learning videos. The importance of appropriate assessment and continuous maintenance of content to keep abreast of scientific and technological developments ensures the sustainability and relevance of biology learning videos. Lastly, maintaining student ethics and privacy is a priority, especially in the online learning era. Data security measures and awareness of ethical issues are an integral part of developing responsible and effective biology learning videos. By combining these aspects, the use of biology learning videos can be a powerful tool in supporting inclusive, engaging and sustainable learning among students.

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