The Use of Digital Media in Empowering Students Digital Literacy and Critical Thinking in Biology Learning

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Abstract
This research is qualitative and aims to find out how digital media is used to empower students' digital literacy and critical thinking in biology learning. The methods used were filling out questionnaires and conducting interviews. Seventy-six eleventh grade students of SMA Negeri 1 Kesesi, Indonesia, and two biology teachers were selected as the research sample in this study. The research results showed the following aspects: Firstly, the student's digital literacy questionnaire is 71%, which is classified as moderate in digital literacy indicators including finding, using sources, selecting, evaluating, considering sources, message effects, and using data to produce work; secondly, students critical thinking skills is 65% which is classified as relatively low, not yet able to assess evidence, compare and contrast various objects with actual conditions and cannot examine them objectively; thirdly, some of the things that teachers do to train these two skills are by inviting students to search for information via Google/search engines and video searches to support the teacher's explanations, using Canva to make some presentation and using Google Lens to image any plants around the school. Unfortunately, teachers do not train them on how to search using appropriate keywords and trusted sources. Finally, teachers must be more active and innovative in maximizing the wise use of digital media to improve students' digital literacy and critical thinking skills.

Keywords: Biology Learning, Digital Literacy, Critical Thinking

Introduction

Education in the 21st century has challenges in the form of VUCA (Volatility, Uncertainty, Complexity, and Ambiguity), a condition that indicates very dynamic and rapid changes, is difficult to predict, difficult to understand the causes and effects of something, and has a variety of results that cannot be explained clearly (Mohanta et al., 2020). These challenges mean that education in the 21st century needs to continuously survive and innovate in the current competitive era. Efforts that can be made are to equip and train students with appropriate skills, such as digital literacy and critical thinking.

In education, especially in biology, digital literacy needs to be trained and studied to form a digitally literate generation of the nation's young people. Increasing digital literacy is able to form self-control as a solution to prevent cases of the circulation of false information (hoaxes) from recurring and increasing in number (Sabrina, 2019). Hoaxes usually contain inaccurate information and hate speech that can incite, corner, and even provoke religious, ideological, and other figures. Hoaxes occurs when non-face-to-face interactions between people on social media encourage courage to express opinions or statements that involve insults, hate speech, and bullying (Jusnita & Ali, 2022).

Critical thinking skills are cognitive activities that are connected to the use of the mind (Cotrell, 2005), or the process of solving problems carefully and thinking clearly. A person with thinking skills will be able to question something appropriately, as well as gather relevant information, obtain logical reasons, and think critically based on existing information to draw a conclusion (Reichenbach, 2002). Critical thinking skills are defined by Greenstain (2012) as a way of thinking about any subject, content, or problem in which a thinker skillfully uses the quality of his thinking and forces his intellectual standards to increase. Thinking skills include cognitive abilities and emotional aspects (disposition). Critical thinking skills include interpretation, inference, explanation, evaluation, self-regulation, analysis, and induction and deduction processes in finding reasons (Profetto-McGrath, 2003). Critical thinking skills require cognitive abilities, a habit of deep inquiry, and a desire to think through different problems. The application of this ability causes a person to feel the need to achieve knowledge in the real world.

Based on the background above, the researcher studied how the use of digital media in high school empowering students' digital literacy and critical thinking skills in biology learning.

Method

The research method is qualitative used mix both quistionaire and interview. The data has taken on 9-10 Oktober 2023 in SMA Negeri 1 Kesesi, Pekalongan, Central Java, Indonesia. Qualitative research is a term with varying meanings in educational research. In example, Borg and Gall (1989) suggest that the term is often used interchangeably with terms such as naturalistic, etnograpic, subjective and pospositivistic. A quistionnaire used to measure students perception about digital literacy and crical thinking skill was used in this research. The initial item bank contained 26 items based on digital literacy and critical thinking skills by Arends (2003). All items were scored on a 5-point Likert Scale. A total 76 eleventh grade students of SMA Negeri 1 Kesesi, Indonesia, completed the quistionnaire. Only those students who completed the full quistionnaire were included in the analyses.

Polit and Beck (2006) defined the interview as a methode of data collection in which one person ask question of another person: interviews are conducted either face to face or by telephone. Two biology teacher of SMA Negeri 1 Kesesi participated in interviews. On average, each interview lasted 40 minutes. All interviews were semi-structured and focused on the three topics included digital literacy, critical thinking skill and digital media. The research questions in this study are following:

- What they know about digital literacy and critical thinking skill?
- What kinds of technolgy do they use before classes?
- What kinds of digital media do they use before classes?
- Do students show digital literacy during classes?
- What kinds method do they use to train digital literacy and critical thinking skill?

Results and Discussion

This study aimed to find out how digital media is used to empower students' digital literacy and critical thinking in biology learning. Student questionnaire results shows that the digital literacy of class XI students at SMA Negeri 1 Kesesi classified as medium with an average yield of 71%, with details of the average for each indicator as follows: The first indicator of digital literacy is skills found that getting a score of 74% was moderate. These results show that students are able to sort through choices and independently find information related to or relevant to the problem.

The second indicator Digital literacy, namely the skill of using sources, gets a score of 69% relatively low, so students are able to access some information, but usually misses the problem keyword. The third indicator of digital literacy, namely chose to get a score of 69%, which is low, indicating that students not yet able to select and make exceptions to the source of information and not being able to make the right choice from a wide range of options. The fourth indicator for digital literacy, namely evaluating, getting a score of 77%, which is classified as moderate, shows that students are able to complete source and author verification but are not yet aware of the bias in the information. The fifth indicator of literacy digital, namely considering the source and effect of the message, gets a score of 77%, classified as moderate, indicating that students are aware that there is persuasive or invitation to the information obtained but unable to explain method used. The sixth indicator of digital literacy is using data to produces work that gets a score of 72%, which is classified as medium, showing that students are skilled at creating new works from the information obtained, however has not used strong analysis and evaluation.

Those result is in line with the results of teacher interviews stated that there were still many students who did not consider the message effect of the information they obtain or use and the information validation process is still minimal, so there are tendencies. Students are easily exposed to biased information and hoaxes.

The student questionnaire shows that the critical thinking skills of the class The indicator of using data to develop critical insight is choosing to get a score of 74%, which is classified as moderate, meaning that students are able to use the selected data to draw conclusions that are in accordance with the facts but are not completely accurate. The analysing indicator gets a score of 53.4%, which is low, meaning that students are able to explain the main problem inaccurately and cannot examine it objectively. The synthesising indicator gets a score of 75%, which is considered moderate, indicating that students are able to identify and compare

the components of an argument but are not yet skilled at combining the components of an argument into one complete piece of new information.

Students' thinking skills are low due to the cognitive training that students are given only around the ability to remember and understand (Saparuddin et al., 2021; Shafira et al., 2023). If critical thinking skills are not trained or developed, a person will continue to be in their initial condition and have an impact on their digital literacy (Delima et al., 2023; Indah et al., 2022).

One of the efforts made by teachers is by creating or using multimedia in learning. Digital multimedia have been proven to be able to increase student motivation and learning outcomes (Nofitasari, 2012; Leow, 2014), as well as improve students' critical thinking skills in science learning (Syawaludin, 2019).

The interview results show that teachers have used digital media in biology learning, for example the use of search engines to add information about the topic being studied, the use of Google Lens to help students naming and classifying plants at school and the use of Canva to make presentations. Unfortunately, this process still lacks teacher supervision, especially in determining reliable sources of information and applying keywords when searching, giving rise to bias and the possibility of misinformation.

Conclusion

Based on the results and discussion of this research, the following conclusions were obtained.

1. Digital media can be use by teacher in biology class to empowering students digital literacy and critical thinking skill.
2. Teacher should choose some leaning model when they use digital media.

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