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Exploring the Need for Using Science Learning Multimedia to Improve Critical Thinking Elementary School Students: Teacher Perception

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Distance learning during this pandemic really needs teaching media, especially on abstract science material. This study aims to investigate the teacher's needs for Science Learning Multimedia (SLM) to Improve Critical Thinking Elementary School Students. First, a survey was adopted to 156 teachers from several elementary schools in Jakarta to explore the extent to which the need for SLM was selected by purposive sampling. Second, semi-structured interviews with 10 teachers to obtain direct and valid information. This research focuses on certain aspects, namely 1) Types of media commonly used. 2) Classification of material that is difficult for students to understand, 3) teachers' perceptions about the need for using science learning multimedia to support science learning and 4) teachers' perceptions about the need for using science learning multimedia to support students' critical thinking. Data were examined using quantitative and qualitative methods. In addition, interview analysis resulted in emerging themes related to several conditions raised by teachers to use SLM effectively. These conditions include 1) SLM material, 2) SLM interactivity, 3) ease of use, 4) and the approach used. Findings show that most teachers agree to develop effective and flexible media in exploring abstract science concepts so that students' critical thinking skills increase. This SLM also needs to pay attention to the above conditions. In conclusion, interactive multimedia based on scientific inquiry in science learning is feasible to be developed and applied in the teaching and learning process. This research can also be a reference and input for educators, especially elementary school teachers in creating models and learning media that are active and fun.

Keywords: interactive multimedia, scientific inquiry, needs analysis, science, learning

INTRODUCTION

The ability to think critically is one of the components of 21st-century skills which consist of 4C, namely critical thinking, creative, collaborative, and communicative. This

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thinking ability can be integrated with learning in elementary schools, one of which is the science content, which is learning that involves students actively in seeking and developing knowledge. In addition, in science learning, students are expected to actively seek and find concepts, be able to analyze a problem, actively discuss, dare to speak to convey ideas, be able to write work results as reports, and be able to read and convey work results. This is in line to learn science, which requires students to be able to do and find something. To achieve these goals (Duchovičová et al., 2019; Lewis & Smith, 1993).

The above statement is in line with (Ampuero, 2015; Atabaki, 2015; Beavers, 2017; Boluk, 2017; Buckley, 2015) which shows that critical thinking skills need to be integrated into authentic and meaningful learning where students are invited to a problem and they are accustomed to solving problems based on the perspectives and solutions of their thinking. Even research (Boluk, 2017) shows that critical thinking skills can reflect the sustainable development goals of 2030. In addition, research (Butler, 2017) stated that critical thinking ability is a better predictor of life decisions from science and intelligence because someone who can think critically can perform analysis, interpretation, inference in solving a problem based on existing facts and concepts. Thus, the above research indicates that critical thinking skills are very important to be trained from an early age so that it is embedded and cultured in children.

Since the COVID-19 pandemic, the Government has issued a study-from-home policy. As a result, students cannot learn directly in class and are limited in communication with teachers and other students. This causes students to be bored with learning. Moreover, it is reinforced by the limitations of teachers in delivering abstract knowledge, forcing students to lack mastery of the material. Therefore, a driving force is needed to move students so that they are enthusiastic about learning so that they can have learning achievement (Dhawan, 2020; Widodo et al., 2020).

Based on the above problems, the researcher wants to analyze more deeply how we as educators can develop students' critical thinking skills even in this era of the COVID-19 pandemic. Of course, this is very complicated. Learning from home is certainly different from learning activities at school. In addition, learning activities must also be supported by learning media to facilitate students in understanding the material, especially in science learning. In the context of science learning in elementary schools, especially in class V, the subject matter is very difficult for students to understand if it is only conveyed verbally. Some of these materials include the respiratory system, digestive system, and blood circulation. If students' understanding is lacking, of course, it will not stimulate their reasoning power. The presence of the media can be the right solution as a communication tool in the science learning process, it is said because the media is able to provide a concrete learning experience so that it is easy for students to understand (Booth, 2016; Kim, 2019; Yosso, 2020). Media can provide opportunities for students to explore the material more broadly so that their thinking skills will develop. (Rihatno & Nuraini, 2017; Wuryan & Yufiarti, 2017). Indirectly, the use of media in the learning process increases the effectiveness of the role of teachers to students.

As knowledge and technology advance, the media has developed into multimedia. Multimedia can facilitate students with various learning styles (auditory, visual, kinesthetic) (Cahyana et al., 2017; Huang, 2019; Shangguan, 2020; Xu, 2016). Research (Amaliyah, 2018; Husein, 2019; Pardjono, 2020; Prabowo, 2018; Riza, 2018; Samaniego-Mena, 2020) it has been proven that the role of multimedia can facilitate conceptual understanding and can increase children's concentration. Most of the research was carried out on middle and high-level students in the field of science and several other fields. However, it is possible that multimedia can be applied to students of elementary school age. On research (Knörzer et al., 2016; Yi et al., 2019) states that there is a positive relationship between openness to experience and learning outcomes which indicates that students are more open and perform better in multimedia-based learning. In addition, multimedia is the latest learning paradigm. Interactive multimedia is a media that combines text, graphics, audio, video, and animation and its appearance to be able to convey information clearly and have interactivity to its users. In line with research (Farkhadov, 2017; Morris & Lambe, 2017; Sausan et al., 2020) has proven that multimedia-based learning is a new orientation in today's education. The results indicate that online learning with multimedia shows a new way compared to traditional learning. Research can be used as an input that multimedia technology is a new orientation in education and is different from conventional approaches. Through interactive learning media, it allows students to be more interested, easier to understand the material, and affects their thinking ability to be more active, creative, and analytical on the material they are learning independently.

In line with the research conducted (Bron & Barrio, 2019; Liu, 2003; Sudarsono et al., 2022) shows that multimedia can affect a person's high-level cognitive skills such as problem-solving, hypothesis testing, decision making, evaluation, and self-reflection. In this study, samples were taken in stratified levels ranging from higher education, secondary education, to basic education. The results show that multimedia can indeed affect students' cognitive skills as long as multimedia development is based on a student-centered approach, for example, problem-solving. It's just that this study was not explained explicitly, the number of samples taken so that it did not show contextual effectiveness. Further research (Erdem & Adiguzel, 2019) shows that the principle of multimedia development must be in line with the development and cognitive load of students. A person will learn more easily in an environment where graphics (images, visuals) and audio narration are presented simultaneously, than in an environment with graphics and written words only. (Oberfoell & Correia, 2016). Of course, this is very much following the existence of multimedia which combines text, graphics, audio, video, and animation so that it can inform messages clearly and attractively. Despite this, research is being done(Erdem & Adiguzel, 2019) using the literature review method so that the research results still have to be strengthened by empirical action. In line with research (Hamidi et al., 2011; Heiney et al., 2019; Mitra & McEligot, 2018; Scheiter et al., 2018; Singh Shilpa & Mishra Sunita, 2016) stated that the use of sustainable multimedia-based case studies provides a successful platform for improving didactic content learning and the development of critical thinking for primary school-aged children. This is because the use of multimedia in elementary schools can make

learning realistic and fun (Budiarto et al., 2020; Dalacosta et al., 2009). In addition, interactive multimedia can attract and motivate students to learn so that learning will feel more contextual and fun (Sun & Jiang, 2015; Wang, 2018).

In his research (Skuballa et al., 2018), he tried to compare two types of meaningful multimedia-based learning, namely how the effectiveness of multimedia learning that involves cognitive activity with multimedia that combines cognitive and behavioural activities. The two lessons tested were effective when cognitive activity was promoted in terms of selecting, organizing, and integrating multimedia information. The results showed that multimedia which involved cognitive activities were more effective than multimedia which combined cognitive and behavioural activities. The integration of the information presented by multimedia will involve a person's cognitive skills, but not their behaviours. Even research (Djamas et al., 2018) clearly shows that interactive multimedia can improve students' critical thinking skills. In this case, the researcher integrates the game into multimedia to attract their attention so they can concentrate more. However, the sample of this study is very limited, namely 30 students, so it must be strengthened by further empirical research. Thus, the existence of multimedia can affect a person's cognitive abilities.

In addition, research (Lai et al., 2019; Syawaludin, 2019) shows that augmented reality-based multimedia can improve students' critical thinking skills. The existence of this multimedia can make it easier to understand concepts, analyse data, and make it easier for them to connect the concept of material contained in the media (Oktaweri, 2019) has researched field needs analysis of multimedia-based learning. The research findings show that games-based interactive multimedia needs to be developed based on several factors, namely: a) Students' lack of High Order Thinking Skills. b) creativity, innovation, and student activities in physics learning are still far from ideal. c) The physics of learning conditions are not optimal in the use of ICT-based teaching materials. d) It is necessary to develop interactive multimedia teaching materials aided by games. The results of the preliminary studies conducted (Oktaweri, 2019) show that interactive multimedia has the potential to improve students' High Order Thinking Skills abilities. Further research(Amir, 2018) shows that multimedia can improve students' critical thinking skills in terms of analyzing data, proposing assumptions, verifying, drawing conclusions, and testing the validity of arguments. The responsiveness and motivation of students' mathematics learning are also positive because multimedia has interactive video displays and complete material, while students feel that the learning process is not limited by time and space. Of course, this shows the advantages of multimedia itself for students. Research (Gandri, 2019; Hanggara & Suhaeti, 2019; Lauc et al., 2020; SAPUTRI et al., 2018). It has also been proven that the use of multimedia in learning can improve students' critical thinking.

Furthermore, the researcher also examines whether this interactive multimedia can be applied to students of elementary school age or not. Some relevant studies prove that multimedia learning can be used in elementary school-age children (Rachmadtullah et al., 2019; SAPUTRI et al., 2018) has proven that the role of multimedia has a positive significance applied to students of elementary school age. This is because the integration

of graphics, text, images, sound, and animation makes learning more concrete, fun, and can increase student activity. Of course, this multimedia concept supports Piaget's theory regarding the cognitive development of elementary school students which is still in the concrete operational stage. Thus, multimedia can be used in elementary school-age students. Furthermore, the researcher also analyzed the role of interactive multimedia in the science subject matter in elementary schools (D Rohendi, N Sumarna, 2017; Djabba et al., 2019; Irfan et al., 2019; Qistina, 2019; Shah & Khan, 2015). It has been proven that this research has proven that interactive multimedia can be applied to science learning and can even affect science learning outcomes. This research uses PowerPoint as the basis for multimedia and the target is elementary school students.

(Sahronih et al., 2019) stated that interactive multimedia has the biggest role to be used as an alternative media for science learning in elementary schools. In his research, he has conducted a meta-analysis study of journal compilations in the 2009 - 2018 period to analyze the use of interactive multimedia in science learning in elementary schools. The results showed that the type of interactive learning media that had the greatest influence in increasing the understanding and achievement of elementary school students was interactive multimedia. The concentration of science the subject that has the greatest measure of influence is science. This is in line with research (Qistina, 2019; Wu & Tai, 2016) which has proven that multimedia in science learning can improve student science learning outcomes. The results of this study indicate that there is an effect of multi-sensory integrated multimedia information technology learning on student motivation and learning outcomes as well as providing references for teachers who apply information technology integrated learning and promotion of related educational units.

In contrast to previous studies, researchers will develop interactive multimedia based on Scientific Inquiry to improve students' critical thinking skills in science learning. Scientific Inquiry was chosen because it aims to train students' abilities in researching, explaining phenomena, and solving problems scientifically. In this case, students will undergo a process of how knowledge is created. Through this model, students will realize that science is tentative and dynamic because science is always developing continuously (Joyce, B. and Weil, n.d.; Siddiqui, 2013). Therefore, something is currently believed to be true, one day it may not be true or change. Therefore, in multimedia based on scientific inquiry, students will be invited to carry out various scientific methods or the inquiry process to find a concept through inductive thinking. This activity will challenge students' ability to analyze a concept. If students are accustomed to doing the inquiry process correctly, their critical thinking skills will begin to develop.

Based on the state of the art analysis above, researchers are interested in conducting field analysis related to interactive multimedia in science learning in elementary schools. This study aims to explore the perceptions and experiences of teachers in teaching science to students and the scope of the media needed to help them teach science to students. This study shows a uniqueness that is different from the previous one where the research subjects are elementary school teachers and the research method uses

descriptive qualitative and the sample population in the Jakarta area is certainly different from the socio-economic and emotional background of previous studies. This research is important to study because it is a preliminary study for further development research.

a. What are teachers' perceptions of the media in science learning ?
b. What are teachers' perceptions of the classification of science material that is difficult for students to understand ?
c. What are teachers' perceptions about the need for using Science learning multimedia to support science learning?
d. What are teachers' perceptions about the need for using Science learning multimedia to support students' critical thinking?

Literature Review

SLM is very useful when used in the learning process. They can improve the teaching and learning process and facilitate students' critical reasoning towards the material being taught. This SLM can be used independently and classically with teacher guidance. This section introduces SLM and critical thinking skills and discusses teachers' perceptions of SLM.

Science Learning Multimedia

It is written that multimedia is a combination of digitally manipulated text, photos, graphic art, sound, animation, and video elements (Clark & Mayer, 2016). In this case, multimedia means combining various types of media. Multimedia is also defined as a form of presentation of material that uses words and images. “Multimedia is define as the presentation of material of material using both words and pictures” (Lawson & Mayer, 2021; Mayer, 2009, 2014).The words referred to are in the form of written text or spoken directly, while the images in question are in the form of graphics, illustrations, maps, animations, and videos. In this case, multimedia means combining at least two or more existing media types.

Science as a special way to know about nature based on observation and experimentation, while knowledge that is not based on empirical evidence of nature is not part of science. Science has also been taught since elementary school age in the form of IPA (Natural Science) content. In the science learning process, it should teach as scientists discover science using process skills such as observing, classifying, communicating results, measuring, and inferring, and conducting experiments (B, Lawrence Flick, 2007; Fazio et al., 2020). However, in certain material concepts, science really needs media to facilitate students' understanding. Of course, science learning multimedia must be able to stimulate students' critical thinking scientifically so that it can support science learning.

Critical Thinking

The world of education is always evolving and now in the teaching and learning process, students should not be treated like sponges in the classroom absorbing knowledge from the teacher, without being given the opportunity to ask questions, conduct assessments or investigations, and be treated with disrespect. Respect is a moral concept that exists

in a person. To be respectful, students must learn to think critically and put it into practice. Even though having the ability to think critically is not a guarantee of being a responsible person, the application of critical thinking can keep someone from making wrong, immoral, and hasty decisions. Critical and creative thinking is oriented to an intellectual process that involves the formation of concepts, applications, analysis, assessing the information collected or generated through observation, experience, or communication as a basis for an action, so that conclusions can be drawn. Critical thinking is thinking to systematically investigate the thinking process itself. The point is not only to think deliberately, but also to examine how we and others use evidence and logic (Elaine, n.d.; , et al., 2022). Students who have the ability to think critically if they get a statement will first examine whether it is logical or not and see the evidence or reasons that accompany it. So that students do not immediately believe statements given by others if they are not accompanied by evidence or proper reasons.

Teacher's Perception of SLM

Although it is clear that SLM can improve science learning, the effectiveness of this multimedia is still debated. Many researchers state that the success of this multimedia will be reduced if this multimedia is not made based on a certain approach or model or if the skills of its users are not considered. Teachers' perceptions can be defined as their views on something that is influenced by previous knowledge and life experiences so that they determine their behavior or choices. When teachers have limited knowledge about the use of new technology in teaching and learning, automatically the learning they do is still conventional (Kumala, et al., 2022).

Knowledge of teachers' views on science learning multimedia should help facilitate student understanding.On research (Knörzer et al., 2016; Yi et al., 2019) states that there is a positive relationship between openness to experience and learning outcomes which indicates that students who are more open and perform better in multimedia-based learning. Besides being able to provide understanding, multimedia is also the latest learning orientation. Interactive multimedia isa multimedia display that combines text, graphics, audio, video, and animation and the display fulfills the function of informing messages and has interactivity to its users.

In line with the research conducted (Bron & Barrio, 2019; Liu, 2003) shows that multimedia can affect a person's higher-order cognitive skills such as problem solving, hypothesis testing, decision making, evaluation, and self-reflection. In this study, samples were taken in stages starting from higher education, secondary education, to basic education. The results show that the existence of multimedia can indeed affect students' cognitive skills as long as the development of multimedia is based on a student-centered approach, for example problem solving.

The above shows why knowledge of teachers' perceptions of SLM in learning is an important factor that will help implement SLM in the education system effectively.

METHOD

This research uses mixed methods, namely by combining quantitative and qualitative data collection and data triangulation to go beyond the limitations of a single method study by increasing the level of credibility. This research aims to explore the need for using SLM in improving critical thinking skills.

Research Design

Collecting data on teacher perceptions of the need to use SLM from the following four aspects (1) media do teachers usually use in science learning, (2) the classification of science material that is difficult for students to understand, (3) to support science learning; and (4) to support student's critical thinking. The research was conducted in two stages, the first was to provide questionnaires to 156 teachers. The second part carried out semi-structured interviews with ten teachers selected from the questionnaire sample. Ten teachers were interviewed about the same construct to gain a deeper understanding of the research constituents as measured by the questionnaire.

Participant

First: the sample questionnaire consists of classroom teachers spread across Jakarta. Questionnaires are available online for easy access by teachers anywhere to fill them out. A total of 156 teachers who returned the questionnaire in complete form were considered as the research sample. Given the physical distancing policy during this pandemic, a purposive sampling technique was used by distributing online questionnaires using Google Forms. Descriptive data on demographic characteristics which include gender, length of teaching experience, educational background, and teacher education level are presented in Table 1.

Table 1
Participant's characteristics (n=156)

	Frequency	%
Gender		
female	86	55.13
Male	70	44.87
Working years as a teacher		
1-5 years	62	39.74
5-10 years	58	37.18
10-15 years	36	23.08
educational background		
Primary Teacher Education	130	83.33
Others	26	16.67
Level of education		
Bachelor's	114	73.08
Master's	35	22.44
Others	7	4.49

Second: The interview sample selection criteria were obtained through the analysis of the questionnaire answers and various responses to help understand the anomalies

revealed by the questionnaire analysis. To begin the sample selection process, a postscript was added to the questionnaire asking participants to provide their contact information if they agreed to be interviewed. The final sample was ten participants.

METHOD

Using mixed methods to answer research questions helps triangulate data, adds rigor, validates and strengthens findings, adds an additional dimension, and helps approach research questions from a different and more in-depth angle. That is why this study used two methods: questionnaires and semi-structured interviews.

Questionnaire

Based on the literature review and the researcher's experience, a questionnaire was created to obtain in-depth information on the four research questions. The first part is related media do teachers usually use in science learning as much as 1 item, the second part discusses the classification of science material that is difficult for students to understand as much as 1 item, the third part discusses the use of SLM to support science learning as much as 7 items; and the fourth part describes the use of SLM to support student's critical thinking as many as 6 items.

Semi-Structured Interviews

To increase the validity of the data, semi-structured interviews were conducted to strengthen the analysis of the quantitative findings so that statistical analysis could examine different effects on certain phenomena and then explore the reasons and reasons behind these effects using other qualitative methods. The interview method was used as the second data collection method.

The interview guide begins with more general questions about the four research questions, after which other questions are developed during the interview session, based on some of the issues raised during the discussion and related to the main topic. Interview questions were piloted with two teachers before delivering the main study.

Procedures

Before being distributed, the validity and reliability of the questionnaire were measured first. Its validity was checked by seeking the opinion of experts in the field, who recommended providing teachers with definitions of the terms “SLM” for science learning multimedia and “CT” for critical thinking before asking them to fill out a questionnaire. Thus, the meaning of the two constructs was clearly written for the participants to read in the introductory part of the survey. To check reliability, the questionnaire was piloted on 30 teachers from different fields of study with different years of experience. Cronbach alpha coefficient was found (0.875), which means the scale is reliable. Finally, a questionnaire was administered to 156 randomly selected teachers from different schools in Jakarta.

FINDINGS

The results of this study aim to present key research findings from both quantitative and qualitative research methods. This presentation will assist in determining whether the quantitative and qualitative findings are consistent or inconsistent.

Quantitative Analysis

The survey sample consisted of 156 teachers from various schools in Jakarta. Participants were asked to respond to 12 statements representing the four research questions.

a. What are teachers' perceptions about media do teachers usually use in science learning ?

In this question, the study findings prove that the media used by teachers in science learning are as follows:

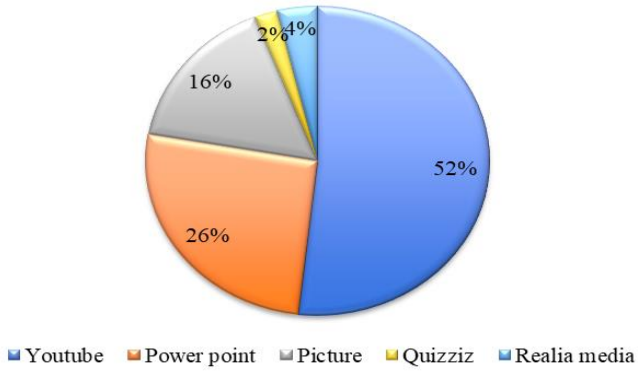

Figure 1
Types of media commonly used

Figure 1 above shows the percentage of media categories that are often used in learning activities (n=156). As many as 52% of teachers use Youtube which is the majority of media compared to other media. Power point users reached 26% which gave the second highest contribution. Followed by image users by 16%. Meanwhile, quizziz users accounted for 16% and realia media users accounted for 2%.

b. What are teachers' perceptions of the classification of science material that is difficult for students to understand ?

The findings of this study prove that the classification of science material that is difficult for other students to understand is as follows. This classification is seen from the teacher's point of view based on student learning outcomes.

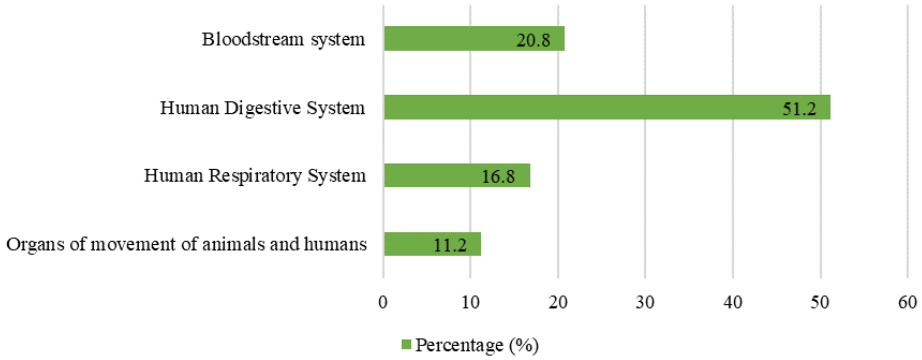

Figure 2
Classification of materials that are difficult for students to understand

Figure 2 shows the classification of material that is difficult for students to understand from the teacher's perception based on student learning outcomes. The type of difficult material that ranks first is the human digestive system as much as 51.2%, followed by the circulatory system material as much as 20.8%, the human respiratory system as much as 16.8% and the movement organs of animals and humans occupy the last place as much as 11. 2%.

c. What are teacher's perception of using SLM to support science learning ?

The third part of the questionnaire aims to answer the first research question: "what theteachers' perceptions about the need for using Science learning multimedia to support science learning.Table (1) describes the frequency and percentage of participants' responses to each statement.

Table 2
Teachers' perceptions about the need for using science learning multimedia to support science learning

No	Statement	SA	A	D	SD	Total
1	SLM can increase students' activeness when studying science	65	48	24	19	156
2	SLM can support science learning goals	39	32	43	42	156
3	The existence of SLM can improve teachers' digital literacy towards media	11	61	82	2	156
4	SLM can increase students' motivation in learning science	80	42	25	9	156
5	Science learning multimedia can accelerate students' understanding in science	96	48	9	3	156
6	Science learning multimedia can clarify the delivery of abstract science material	132	21	3	0	156

SD=Strongly Disagree. D=Disagree. A=Agree. SA=Strongly Agree

It is clear from Table (2) that most of the participants agreed or strongly agreed in the first rank about the ability of Multimedia learning science in science can clarify the delivery of abstract material by (n= 132; 84.61%). This indicates that the teacher agrees that Multimedia learning science in science can clarify the delivery of abstract material. The existence of elements of interactivity and ease of use in multimedia can clarify abstract material so that it can be understood by students.

d. What are teachers' perceptions about the need for using Science learning multimedia to support students' critical thinking?

This fourth section directly discusses how the teacher's view is whether SLM can support students' critical thinking. The presentations received included:

Table 3
Teachers' perceptions about the need for using Science learning multimedia to support students'critical thinking

No	Statement	SA	A	D	SD	Total
1	SLM helps students analyze science concepts	67	34	20	35	156
2	SLM helps students classify an object	39	67	13	37	156
3	SLM helps students learn to reason independently	79	54	18	5	156
4	SLM can stimulate students' critical thinking skills as long as it is integrated with a scientific approach	88	37	28	3	156

SD=Strongly Disagree. D=Disagree. A=Agree. SA=Strongly Agree

It is clear from Table (1) that most of the participants agreed or strongly agreed in the first rank about the ability of SLM to stimulate students' critical thinking skills (n= 88; 56.41%). This indicates that the teacher agrees that SLM stimulates critical thinking skills as long as it is integrated with a scientific approach. In this case, students will be invited to do various scientific methods to find a concept by means of inductive thinking. This activity will challenge students' ability to analyze a concept. If students are accustomed to doing the inquiry process correctly, then their critical thinking skills will begin to develop.

Qualitative Analysis

Interviews with ten teachers were conducted, recorded, and transcribed. After full transcription, data is reviewed verbatim and line-by-line, keywords are assigned as first-level codes next to each paragraph, and labels are assigned to each word group. Labels are grouped to form categories at the second level of coding. Through this interview, I was able to sort the categories into two themes: those that are directly related to the research question (the main theme) and those that arise and can be related in a certain way (indirectly) to the research question (the emerging theme).

The results showed four main themes (1) media do teachers usually use in science learning, (2) the classification of science material that is difficult for students to understand, (3) to support science learning; and (4) to support student's critical thinking and one emerging theme (condition for use), as shown in Figure 3.

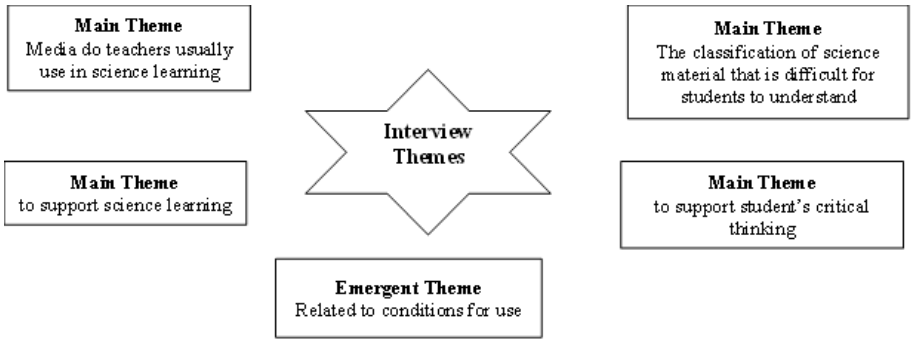

Figure 3
Interview themes

Main Themes

The interview analysis resulted in four main themes reflecting the research questions: (1) media do teachers usually use in science learning, (2) the classification of science material that is difficult for students to understand, (3) to support science learning; and (4) to support student's critical thinking. Teachers seem to be aware of the importance and benefits of using SLM in general. They believe that using SLM can overcome the limitations of the media they experience, especially it can help teach abstract science materials. In addition, SLM can improve the quality of science learning and can stimulate critical thinking skills.

Some teachers agree that they are used to relying on YouTube to explain abstract science material during a pandemic.

During this pandemic, I usually use YouTube to explain scientific material.

(teacher 1)

I have difficulty teaching science indirectly, so I ask students to learn from youtube instead. (teacher 5)

In difficult science material classifier, some of them answer different kinds of material

In my opinion, the material that is difficult to teach is the human digestive system. This is because it is difficult to describe the human digestive tract concretely. (teacher 7)

I find it difficult to teach material about the circulatory system because it is difficult to reach with a simple experiment. (teacher 2).

Then, they agreed that SLM can support science learning in an active and fun way.

I totally agree with SLM, children understand faster, have fun, and are active in exploring. (teacher 10)

In addition, they also agreed that SLM can stimulate students' critical thinking skills.

In my opinion, the existence of SLM can stimulate children's mindset to be more critical. especially if in the multimedia there are activities that stimulate children's reasoning power to become more active. (teacher 9)

I agree with that. SLM can improve children's critical thinking skills. Through the activity of analyzing, classifying can stimulate children's critical thinking. (teacher 3)

Based on the statement above, it can be assumed that the media often used by teachers in science learning is YouTube media and materials that are difficult to teach include the human digestive system and the circulatory system. In addition, all respondents agree that SLM can support science learning and stimulate students' critical thinking skills.

Emerging Themes

"Conditions for use" was one of the themes that emerged from the interview analysis. These themes were coded and analyzed in the following categories: (1) digital literacy, (2) SLM interactivity, (3) ease of use, (4) and integrated approach. See figure 2.

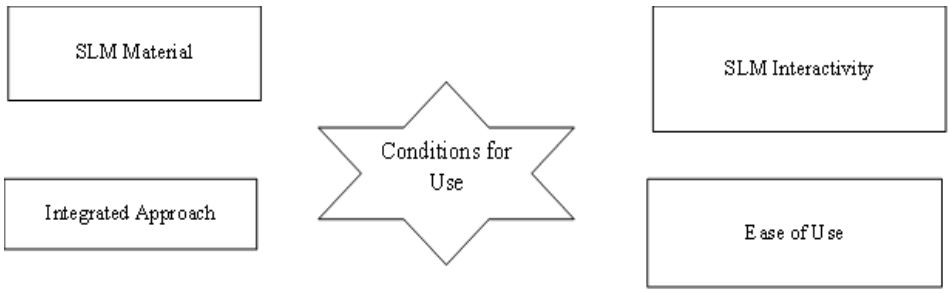

Figure 4
Interview emergent issues

In general, teachers emphasized the need to use SLM in the science learning process. However, they put forward many conditions for the use to be successful. 7 teachers emphasized the importance of integrating a problem-based learning approach into the SLM so that the multimedia created could facilitate students' scientific thinking so that they could improve critical thinking skills. In addition, the material content in the SLM also greatly influences the success of using the SLM. In addition, the SLM that is developed must also be considered in terms of ease of use and has an element of interactivity.

DISCUSSION

In general, this research was conducted to identify the potential needs of teachers for interactive multimedia in science learning. Based on the findings, as many as 95.51% of teachers need interactive multimedia will be developed in science learning, especially on abstract material. In addition, based on the findings, the classification of material that is difficult for students to understand seen from the teacher's perception based on student learning outcomes is the material of the human digestive system. Therefore, it is very

visible that the existence of interactive multimedia in science learning, especially on the material of the human digestive system, is needed in the field.

From the research results, teachers need media that are effective, flexible, and easy to use by both teachers and students in actively exploring science concepts. If the limitations of this media are not immediately addressed, science learning will not be meaningful in students' lives. Supported by research (Meedya et al., 2019; Mutch-Jones et al., 2021) emphasized that several things need to be considered in science learning, including connecting knowledge with practice and problems, using technology, and making it real. Therefore, we need media that can be used by teachers to facilitate students learning to understand abstract science concepts so that they can stimulate students' critical thinking skills.

Research (Amaliyah, 2018; Husein, 2019; Pardjono, 2020; Prabowo, 2018; Riza, 2018; Samaniego-Mena, 2020) has proven that the role of multimedia can facilitate conceptual understanding and can increase children's concentration. Most of the research was carried out on middle and high-level students in science and several other fields. However, it is possible that multimedia can be applied to elementary school-age students. On research (Knörzer et al., 2016; Yi et al., 2019) states that there is a positive relationship between openness to experience and learning outcomes which indicates that students who are more open and perform better in multimedia-based learning. Besides being able to provide understanding, multimedia is also the latest learning orientation. Interactive multimedia is a multimedia display that combines text, graphics, audio, video, and animation and the display fulfills the function of informing messages and has interactivity to its users. In line with research (Farkhadov, 2017; Morris & Lambe, 2017) who have proven that multimedia-based learning is a new orientation in today's education. The results indicate that online learning with multimedia shows a new way compared to traditional learning. Research can be used as an input that multimedia technology is a new orientation in education and is different from conventional approaches. Through interactive learning media, it is possible for students to be more interested, easy to understand the material, and influence their thinking skills to be more active, creative, and analytical towards the material they learn independently.

Seeing the potential needs above, researchers will develop interactive multimedia based on Scientific Inquiry to improve students' critical thinking skills in science learning. Scientific Inquiry was chosen because it aims to train students' abilities in researching, explaining phenomena, and solving problems scientifically. In this case, students will undergo a process of how knowledge is created. Through this model, students will realize that science is tentative and dynamic because science is always evolving (Joyce, B. and Weil, n.d.; Siddiqui, 2013). Therefore, something that is currently believed to be true, in the future it will not necessarily be true or change. Therefore, in scientific inquiry-based multimedia, students will be invited to carry out various scientific methods or inquiry processes to find a concept through inductive thinking. This activity will challenge students' ability to analyse a concept. If students are used to doing the inquiry process correctly, their critical thinking skills will begin to develop.

Scientific inquiry-based learning is designed to involve students in truly original research problems by exposing students to the field of investigation, helping students identify conceptual or methodological problems in the field, and inviting students to design ways to solve these problems (Ertikanto et al., 2017; García-Carmona et al., 2017; Klucevsek, 2017). Thus, students can find out how knowledge is created and built. At the same time, students will also appreciate knowledge as a result of a painstaking research process and may also learn about the limitations and advantages of current knowledge. Indirectly, scientific inquiry-based learning can stimulate students' critical thinking skills. In line with research (Arsal, 2017; Duran, 2016; Kremer et al., 2007; Sandika & Fitrihidajati, 2018; Siburian et al., 2019) has shown that inquiry-based learning can improve students' critical thinking skills. In inquiry-based learning, they will be motivated to try to think scientifically to always carry out inquiry activities such as conducting observations or collecting data from various sources to find the truth of a concept. Through a systematic and scientific process that is carried out, it can stimulate students' critical thinking skills. Backed by research (Jong et al., 2021; Suryanti et al., 2018) states that inquiry learning can train students' critical thinking skills because this type of learning is designed to invite students directly into the scientific process in a relatively short time. (Ertikanto et al., 2017; Hwang & Chen, 2017; Jeon et al., 2021) shows that inquiry exercises can improve scientific understanding, be productive in creative thinking and students become skilled in obtaining and analysing information. In addition, SLM development also needs to pay attention to material, ease of use, and interactivity. Through the elements of interactivity, videos and animations in SLM can clarify a concept of the material to be taught so that learning becomes active and fun.

CONCLUSION

Based on the findings and discussion of the research, most teachers agree with the need to develop an integrated SLM with a certain approach to improve students' critical thinking skills. the approach chosen is scientific inquiry. This result is supported by several statements, namely (1) media science that is often used by teachers is limited to You tube; (2) the classification of material that is difficult for students to understand is the human digestive system; (3) they agree that SLM can support science learning to be more active and fun; and (4) they also agree that SLM can improve students' critical thinking skills. Therefore, based on this needs analysis, researchers will develop interactive multimedia based on scientific inquiry to improve students' critical thinking skills in science learning. Through scientific inquiry, students will be motivated to try to think scientifically to always carry out inquiry activities such as conducting observations or collecting data from various sources in order to find the truth of a concept.

The results of this study are the first step of the next research, namely the development of interactive multimedia. This needs analysis can be used as an illustration of the conditions of science learning in the field so that it can be used as a reference for further researchers who want to develop appropriate science learning media and models for elementary school students during the Covid-19 pandemic.

LIMITATIONS AND SUGGESTIONS

This study uses a survey to explore the perceptions and experiences of teachers while teaching students in science learning during the COVID-19 pandemic. As with all research, this study has limitations. This study is a small representation of elementary school teachers who experience online learning models in the City and Village areas around Jakarta Province. For this reason, future research becomes more comprehensive and requires quantitative studies or mixed methods studies with a wider sample. Future research can discuss the development of interactive media that can be used in online and offline learning. This research can also be used as preliminary research for the development of appropriate science learning models for elementary school students from various backgrounds.

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