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# Analysis on Significances of SETS-Based Science Teaching Material for PSET Students in Online Learning

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**ABSTRACT**

This research aims to present the results of the analysis of the significances for SETS-based science teaching materials (Science,Environment, Technology and Society) in online learning which includes (1) the results of significances analysis for SETS-based science teaching materials, (2) the benefits of SETS-based science teaching materials in online learning. This research was conducted at the PGRI Yogyakarta University using qualitative research methods. Data was collected through observation, unstructured interviews and documentation. The results showed that (1) SETS-based science teaching materials is needed by students at PGRI Yogyakarta University in the distance or online learning process in the midst of the Covid-19 pandemic to facilitate the teaching and learning process, (2) the benefits of SETS-based science teaching materials in online learning are that with SETS-based teaching materials students can transform knowledge in the form of technology and develop students' social skills. With the use of SETS-based teaching materials, students are hopefully in ease to access teaching materials because there are no limitations between space and time. In addition, students can explore science knowledge by involving real life and the environment in which they live and can provide benefits to the community.

**Keywords**: *Teaching Materials, SETS-Based Science Material, Online Learning*

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## INTRODUCTION

Education plays an important role in the process of developing a nation. The world of education is expected to provide human resources who have a professional spirit to advance the nation with knowledge. Indicators of professional human resources must embedded with good knowledge in the academic field, master teaching skills, having experience in teaching and having pedagogic competence (Hidayah, 2018). In order to achieve advanced education, of course, one must optimize the learning process by involving modernization activities through technological

advances. With education, it is hoped that it can make a new generation that is independent, has skills and knowledge in achieving national progress (Atsani, 2020).

Early in 2020, China, precisely in Hubei Province, was exposed to a deadly virus named Covid-19 or what people usually call the corona virus. WHO has announced a global health emergency according to the level of spread of the Covid-19 virus in China and various other countries (Velavan & Meyer, 2020). Symptoms experienced by someone infected with the Covid-19 virus in general are respiratory disorders, loss of sense of smell and loss of sense of taste which makes a person experience shortness of breath, fever, cough, body aches, smell disorder and taste disorder (Ningsih, 2020). In Indonesia, the central government is supported by the regional government to form a Covid-19 handling group to tackle the spread of the virus. However, all prevention and handling of the pandemic did not run optimally, because the number of transmission of the virus continued to increase. This causes all activities that involve large crowds of people to be limited, one of which is in the field of education. All teaching and learning activities in all educational institutions are transferred to online learning.

Online learning is a new paradigm in the education system, regarding the implementation of learning does not have to be face-to-face in a classroom. According to (Puspaningtyas & Dewi, 2020) the implementation of online learning involves technology in the teaching and learning process. The implementation of online learning that is applied at this time is not fully in accordance with a good learning situation, but in the implementation of online learning that is applied only following the current emergency situation (Sakti & Sulung, 2020). The social restrictions that we are currently facing force students to be enthusiastic about pursuing education. This is also felt by PSET (Primary School Teacher Education) students at PGRI Yogyakarta University who carry out online learning. In the era of the Covid-19 pandemic, it certainly brought enormous changes for PSET (Primary School Teacher Education) lecturers and students at PGRI Yogyakarta University since face-to-face learning is now conducted online by involving the internet network.

The strength of the internet network is the main factor that has an influence in online learning, in addition to the main factors there are supporting factors in the implementation of online learning, that is to mention, communication tools such as computers or laptops, and mobile phones with advanced features. The obstacle that is often faced when learning online is that some students have difficulties in accessing the internet network. The weak quality of the internet network makes this online learning process not run optimally. As a result, some students may have difficulty in understanding the subject matter given. (Anggianita et al., 2020) in rural areas online learning has not been running effectively due to technological limitations. This online learning process also makes it difficult for lecturers to measure the extent to which students understand the material provided. In research conducted by (Dewantara & Nurgiansah, 2020) at PGRI Yogyakarta University it was found that the lack of knowledge in the field of information technology possessed by lecturers, especially elderly lecturers, made online learning difficult to implement.

Another obstacle is the difficulty of buying internet quota, because there are some students who have a low economy or have difficulty in accessing buying quotas. In addition, lecturers often give too many assignments which make students easily bored and stressed. It is better to pay attention and take into account the learning obligations and abilities possessed by students, so that during the learning process they do not only give assignments in the form of questions in large numbers but can give

assignments to conduct experiments, analyzes and observations in the surrounding environment (Puspitorini, 2020). One way to overcome these obstacles is to use effective teaching materials in the online learning process.

Teaching materials are all materials in the form of audio-visual media, print media, and electronic media provided to facilitate educators in the learning process to achieve educational goals (Octariani & Rambe, 2018). Teaching materials that have been prepared by educators may affect the success and learning outcomes of students (Saputra & Fahrizal, 2019). Teaching materials that have been systematically arranged are expected to be used by students independently. Teaching materials are said to be good if the teaching materials include at least how to use them, the goals to be achieved, the content of the subject matter, supporting information, practice questions, the system, and evaluation (Hendriana et al., 2019). The teaching materials used in this online learning process involve interactive multimedia. Developing interactive multimedia teaching materials for learning is one solution to the problems faced during Covid-19 pandemic.

Research related to teaching materials used during online learning is research conducted by Muhammad Fahmi Apriansyah and Heni Pujiastuti (2020) which focuses on development of teaching materials in mathematics subjects based on virtual learning by using Gnomio. Furthermore, research conducted by Muhfahroyin and Agil Lepiyanto (2021) focused on teaching materials with biology materials through learning communities in virtual collaborative learning during Covid-19 pandemic. In addition, research conducted by Farda and Rinjani discuss about development of printed teaching materials in science subjects with the SETS (Science, Environment, Technology, and Society) vision. The characteristics of the SETS version of science teaching materials are combining natural resource materials with SETS elements (Farda & Rinjani, 2018). The teaching materials developed by Farda and Rinjani have obtained valid and effective results. While this research focuses on the need for SETS-based science teaching materials for PSET (Primary School Teacher Education) students at PGRI Yogyakarta University during online learning.

Students at PGRI Yogyakarta University use teaching materials not only from lecturers but students are allowed to search for teaching materials via the internet and the surrounding environment. By using interactive multimedia teaching materials, students are expected to be active and not feel bored in the learning process, especially in the Basic Science Concepts course. Natural Sciences major is one of the fields of study that is closely related to the knowledge of the natural surroundings, where the knowledge learned is relevant to nature and in the learning process conducting experiments to find out the truth of a knowledge (Wiyono & Budhi, 2018). Science emphasizes more on a scientific attitude and focuses on students (Wibowo, 2018), as well as science process skills that must be possessed (N. R. Dewi et al., 2019). Therefore, when learning science, students are required to be more active and creative to find and explore the material being studied.

During the practice of science learning in the era of the covid-19 pandemic, students were given leniency to practice at home by utilizing the surrounding environment. This shows that the field of science is a science which in the learning process involves direct observation. One of the efforts that can be made to support science learning in the pandemic era is SETS-based teaching materials. SETS is an integrated learning approach in four elements comprises science, environment, technology and society. In the learning process through the SETS approach, students can involve learning science with environmental, technological and community aspects

(Riwu et al., 2018). So that students get a variety of new knowledge in each learning process and students can develop scientific and social skills.

The SETS approach is a learner-centered approach and the SETS approach is very suitable to be applied to science learning in the pandemic era because through the SETS approach students can explore science knowledge in the surrounding environment and society, and when practicing science learning students are given leniency to practice in house by utilizing the environment around the house. From this background, the researchers are interested in conducting research on "Analysis on significances of SETS-Based Science Teaching Material for PSTE Students in Online Learning". The purpose of this research is to determine the need for SETS-based science teaching materials for PSTE (Primary School Teacher Education) students at PGRI Yogyakarta University in online learning.

**METHOD**

The type of research used is a qualitative research. Qualitative methods are used to obtain in-depth data and the data obtained contain benefits. This research was conducted at the University of PGRI Yogyakarta. The research subjects included 35 students of PSTE PGRI Yogyakarta University. From the research subject, it is expected to obtain complete data regarding the need for SETS-based science teaching materials. Research subjects were determined based on purposive sampling technique. The type of research used is a qualitative descriptive approach. The reason for using a qualitative description approach is to describe a phenomenon that is in the field. According to (Arikunto, 2014) stated that the assessment instrument is a tool used by research in collecting data in order to facilitate a research activity and the results are well organized. The data collection instrument used observation guidelines, interview guidelines, and documentation guidelines about the need for SETS-based science teaching materials for PSTE students in online learning.

The procedure for collecting data in this research was carried out through stages, that is by making observations during the learning process. The next stage is conducting unstructured interviews with students. Interviews in this research used unstructured interviews to obtain more detailed and in-depth data. The results of the interview are stated in the interview dialogue. Next step is the documentation, the document data carried out are texts and photos of teaching materials. After getting the results of observations, interviews and documentation, the next stage is grouping the data and presenting the data. The next stage is triangulate data sources and techniques.

According to (Sugiyono, 2015) source triangulation is functioned to test the credibility of the data by checking the data that has been obtained through several sources. Triangulation of this source is used by research to check the data obtained from students. While technical triangulation is testing the credibility of the data by printing data on the same source with different techniques. This triangulation technique is used by researchers after getting the results of interviews which are then checked with the results of observations and documentation. From these two techniques, of course, it will produce a conclusion regarding the need for SETS-based science teaching materials for PSTE students in online learning. The data analysis used in this research is the interactive model of Mathew B. Miles and A. Micheal Huberman (Sugiyono, 2017) which includes data collection, data reduction, data display, and Conclusion drawing or verification.

**RESULT AND DISCUSSION**

The Covid-19 pandemic has had an impact on worrying conditions and created many new problems, especially in the field of education. Distance learning is one of the alternative solutions in implementing learning in the midst of the Covid-19 virus outbreak. Problems that often occur in online learning are difficulties in accessing the internet and students get bored easily in learning, especially in science learning which requires understanding concepts. This makes lecturers innovate and develop to make it easier for students to gain knowledge and skills during online learning. The innovation developed by the lecturers is by innovating SETS-based science teaching materials. Through SETS-based science teaching materials, it is hoped that students can have an integrated view of something by involving the four SETS aspects (Science, Environment, Technology and Society), so that they gain a deeper understanding of the knowledge they already have (Sarjono, 2020). With the understanding possessed by students in depth, they can take advantage of knowledge in students' real lives.

The teaching materials used during the Covid-19 pandemic are student-focused teaching materials based on current needs and conditions that require students to study at home (Nurbaeti, 2019), as well as the teaching materials used to adapt to the intellectual development of the students. Teaching materials greatly affect student learning outcomes. Thus the teaching materials used should be able to facilitate students' understanding of the learning material. SETS-based science teaching materials are teaching materials that discuss material that links science, the environment, technology and society. Indirectly, SETS-based science teaching materials have a concern for the environment or human life systems. The results of interviews conducted by PSTE students at PGRI Yogyakarta University showed that during online learning, PSTE students really needed SETS-based teaching materials. This is supported by the statement of one of the PSTE students who stated that:

*"…When learning online, I really need SETS-based science teaching materials to add insight in the form of knowledge and technology that can be applied in social life and make it easier to access science teaching materials" (VPR).*

Teaching materials are a component that contains learning materials that are systematically arranged and used during the learning process (Lubis, 2018). This shows that teaching materials are very useful for students in understanding the concepts of learning materials. During the Covid-19 pandemic, SETS-based science teaching materials were urgently needed to support the online learning process because basically the life of an individual, aspects of science, environment, technology and society are interconnected with each other. This strengthens that students carry out learning activities to prepare for life in society. Students must live in society and interact with the natural surroundings. From the community, students can get to know nature which is implemented in science concepts that are used to meet the needs of life in the era of modernization through technological developments. With SETS-based science teaching materials, it is expected to provide new knowledge.

The learning process, especially in science material, cannot only explain the material, but requires an overview such as teaching materials. Teaching materials used during online learning should involve the environment around the home and the real life of students so that students can easily understand the material presented. With SETS-based science teaching materials, it is easier for students in the learning process. Moreover, if the network is constrained during the learning process, students can access the teaching materials and study on their own. Therefore, students need SETS-

based teaching materials in science material. As stated by one of the following PSTE students:

*"The teaching materials used in science courses are related to SETS because in the learning materials there are various problems that often occur in real life as well as how to overcome and deal with these problems. Moreover, when learning online, SETS-based teaching materials are more needed because it makes it easier for students to access science teaching materials using technology. In addition, SETS teaching materials are related to the surrounding environment such as ecosystem subjects which require students to take advantage of the environment. With the use of the environment, it can make it easier to explore knowledge" (RA).*

According to (Imamora et al., 2020) Science subjects, learn about the characteristics of nature and the relationships that exist in it and can provide benefits for community life and the surrounding environment, so that students care about the environment. SETS-based teaching materials support online learning and provide benefits for students in the online learning process, the benefits are that with the SETS approach students can transform knowledge in the form of technology and develop students' social skills. At PGRI Yogyakarta University, teaching materials used by PSTE lecturers as a means of online learning cannot be separated from technology support. This statement is in line with the results of interviews with PSTE students who stated that:

*"…the science teaching materials that I received while attending online lectures provided a lot of benefits. One of them is on the material of the circulatory system which is explained by utilizing technology. The unique and not boring explanations make learning science fun and make it easier to understand how the human circulatory system works…" (ENS)*

Teaching materials that utilize technology are teaching materials that are developed using technological aids to compile data, and obtain data and manage data obtained by involving many ways to produce material that has good categories (Rahmadani et al., 2018). The use of technology that is integrated into science teaching materials is very helpful for lecturers in the learning process, so that they can achieve the learning objectives. In addition, the use of science teaching materials that involve technology can help explain the material more interestingly to students and convey the material in a coherent manner. In line with opinion (Sholeh & Sutanta, 2019) which states that by utilizing technology as a means of delivering material, it can create a more interesting and fun learning atmosphere so as to motivate students to study independently.

By utilizing technology in the teaching materials used, SETS-based science teaching materials are very much needed by PSTE students at PGRI Yogyakarta University. Another benefit of SETS-based science teaching materials in supporting online learning is that students have a concern for the surrounding environment or living system with scientific knowledge, and how science can affect the environment and society and its reciprocity. In online learning, SETS-based science teaching materials used by students can be studied independently and with an unlimited time span due to the involvement of technology, which makes it easy for students to access teaching materials. This is in accordance with the statement by (Djelita, 2014) which states that teaching materials have an important role in the learning process, with the existence of teaching materials students can study independently, students are free to determine the topics they want to study, students learn on their own abilities, and students can study anytime and anywhere.

The SETS-based science teaching materials used will be easier to understand if they involve contextual learning. Contextual learning is an approach that emphasizes the full involvement of students to find the material to be studied, where contextual learning has a relationship between learning in the classroom and learning in everyday life and in the community (Budiman et al., 2020). Contextual learning is more effectively used when online learning uses SETS-based science teaching materials because science subjects are related to the natural environment and SETS-based science teaching materials are closely related to the environment, and cannot be separated from students' real lives. Knowledge through the introduction of a strong environment will facilitate the incoming knowledge as the initial foundation for the entry of new knowledge. The coherence of new knowledge with previous knowledge makes it easy for students to understand and strengthen their previous knowledge.

The learning materials that are included in science teaching materials at PGRI Yogyakarta University already cover four aspects of science, environment, technology and society. One of the basic science-based concepts SETS is on ecosystem material. Where in the ecosystem material, students learn about animal and plant ecosystems that can be found in their living environment. The science materials in SETS-based teaching materials are expected to motivate students to work scientifically on science concepts through practicals, problem studies, discovery and exploration of science knowledge involving students' real lives and the environment they live in and can provide benefits to society. In addition, the material contained in SETS-based science teaching materials is expected to help students to imply understanding concepts in the real world through phenomena that occur in the environment.

The results obtained in the field show that PSET students at PGRI Yogyakarta University really need SETS-based science teaching materials during online learning. With SETS-based science teaching materials used during the teaching and learning process during Covid-19 pandemic, SETS can make it easier for students to understand the material given by lecturers since science material is related to the surrounding environment. Moreover, the teaching materials used involve students to think creatively to find out information and knowledge in the surrounding environment and in the community. The SETS-based science teaching materials used involve technology, so that if during the online learning process students are constrained by the internet network, students can easily access these teaching materials anytime and anywhere.

Research conducted by Farda and Rinjani have found out that science material is very suitable especially when it involves elements of SETS (Farda & Rinjani, 2018). Students are invited to export knowledge in the surrounding environment. The first step during the learning process by involving elements of SETS is to determine problems which then students can actively solve these problems by seeking information and learning resources through the environment and society (Farda & Rinjani, 2018). In line with research conducted by (Candra et al., 2020) which stated that the SETS approach is very suitable to be used in science learning to improve students' cognitive abilities, if the science knowledge gained by students during learning in which is very good, so positive attitudes of students will grow carefullnes for the environment because the learning process integrates science subjects with the environment from various perspectives. Meanwhile, according to (Ulfah et al., 2020) learning science through the SETS approach can train students' abilities in understanding various aspects of the science process and the ability to implement science knowledge in students' real lives.

Furthermore (Zahra et al., 2019) stated that SETS learning in explaining learning material was carried out through elements of science, environment, technology and society. By involving the environment in the learning process can help students to develop their knowledge and skills, while by involving technology in the science learning process students can find out the development of science (Nurhayati et al., 2017). This is reinforced by the statement (Putri, 2019) which states that SETS learning is contextual and comprehensive so it is hoped that students can master science concepts, increase creativity, and be innovative during the learning process. Furthermore, research conducted by (PR Dewi et al., 2020) stated that SETS-based science learning can foster curiosity about surrounding natural phenomena and causal relationships of problems that occur in the environment and society, find ways to solve existing problems through methods scientific knowledge, and can apply their findings in everyday life. So, the SETS-based science learning process emphasizes attitudes, processes, products and the application of discoveries in everyday life. Therefore, the learning process is not only during learning hours in the classroom, but students are allowed to study outside the classroom to complete the tasks given by involving the environment and the community.

This research is an illustration of the need for SETS-based science teaching materials in online learning. The need for SETS-based science teaching materials is very much needed by PSET students at PGRI Yogyakarta University when learning online. SETS-based science teaching materials used during learning involving real life and student living environment. In addition, SETS-based science teaching materials provide benefits for students to transforming knowledge in the form of technology, making it easier for students to access teaching materials because there are no limitations between space and time, and students can explore science knowledge independently in their living environment.

## CONCLUSION

The conclusion obtained based on the results of this research is that the Covid-19 pandemic has had a huge impact on the world of education. With the policies of the local government and the central government that requires the learning process from home. Developing and innovating SETS-based teaching materials is one of the solutions in online learning. SETS-based science teaching materials are urgently needed by students at PGRI Yogyakarta University regarding the distanced or online learning process in the midst of the Covid-19 virus pandemic to facilitate the teaching and learning process. SETS-based teaching materials provide benefits for students in the online learning process. The benefits obtained are that with SETS-based teaching materials, students can transform knowledge in the form of technology and develop students' social skills. With the use of SETS-based teaching materials, students are hopefully in ease to access teaching materials because there are no limitations between space and time. Moreover, students can explore science knowledge by involving real life and the environment in which they live and can provide benefits for social life. Knowledge through the introduction of a strong environment will facilitate the incoming knowledge as the initial foundation for the entry of new knowledge. The coherence of new knowledge with previous knowledge makes it easy for students to understand and strengthen their previous knowledge.

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Baroroh Iskhamdhanah (BI) is the first author of this article. Pratiwi Pujiastuti (PP) is the second author that have provided academic support. Last but not least, Setyo Eko Atmojo (SEA) is the third author in carrying out this research from the beginning of the study to the end of the study. All authors have actively participated in the research that has been conducted and agreed to the final result of writing the article.

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