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Analysis of Teacher Perceptions: Efforts to Grow Science Process Skills in Elementary Schools through Learning Media

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Abstract

Learning science is very closely related to the environment of students, but the benefits are still not felt by students. The purpose of this study was to know teacher perceptions in fostering science process skills of elementary school students through learning media. Needs analysis in terms of the teacher's point of view to see the extent to which science process skills have been pursued, then expected can assist teachers in knowing the needs that are by the characteristics of the student learning environment in fostering science process skills. The method in this research is qualitative research with data collection techniques carried out through interviews and questionnaire. The subjects of the study were 9 elementary school teachers who taught science and used learning media. The results showed that teachers now have a good understanding of science process skills. However, teachers have difficulty in designing the learning process and implementation because there is no available learning media that can be used to support SPS learning. Therefore, the need for a digital web learning media according to the characteristics of elementary school that can be used to encourage SPS.

Keywords : Elementary Teacher Perceptions; Learning Media; Science Process Skills

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INTRODUCTION

Natural science content does not only contain a number of theories but also various practical and investigative activities that require students to actively and skillfully use various skills in the learning process (Yulita, 2018). Learning will be more meaningful if students are able to discover the concepts learned by themselves through a process of daily observation activities that can develop students' process skills (Aktamis & Ergin, 2008). However, science process skills (SPS) have so far been lacking. Students are rarely given the opportunity to understand the phenomena around them based on the concepts they have learned (Rahmani, et al., 2015). So far, science learning has a tendency to only hone the aspects of remembering and understanding, not training students' skills in inquiry (Yuliati, 2016).

In previous research, it was revealed that one of the factors influencing the low science process skills of students was due to the implementation of teacher-centered learning (Juhji, 2016; Widayanti, 2015)). Science process skills are related to scientific attitudes, learning concepts, and scientific products produced through the learning process (Sari et al., 2018). Teachers play an important role in learning that influences the implementation of the science process skills curriculum (Rohaida & Kamariah, 2005). Students should be taught by science teachers who master these skills (Balfakih, 2010). Teachers can exert a great influence on student learning, even in relatively ineffective schools (Marzano et al., 2001). In order to teach skills effectively and meaningfully to children, teachers must have a firm understanding of the

underlying meaning of SPS and demonstrate competency in SPS both operationally and conceptually (Settlage & Southerland, 2012).

In a study conducted by Shahali et al. (2017) found that teachers' SPS conceptual knowledge was relatively low. Then Novianty et al. (2018) described teachers' perceptions of science process skills, and found problems with the scope of assessment. Several developments have been made to support the learning applied by the teacher. Sudarisman (2011) carried out learning innovations to design homework assignments based on HSPS (Home Science Process Skill). Learning development is also carried out by Osman & Vebrianto (2013)through multimedia learning media to improve SPS. However, none of the previous studies have been equipped with an analysis of learning media needs based on teacher perceptions in the field to support science process skills. According to Ulfaeni (2018) through appropriate learning media can improve science process skills. So it is necessary to review the competence and perceptions of teachers in developing science process skills in elementary school students through the learning media that have been used so far.

The science learning process should be conditioned to develop thinking skills, solve problems and emphasize giving direct experience through investigating and discovering activities with the aim of helping students gain understanding (Özgelen, 2012). According to Rohaida & Kamariah (2005)other factors that influence science process skills are the readiness of students to carry out various activities such as observing, classifying, collecting, analyzing, giving interpretations, communicating the results of observations. Teachers are expected to have a role in all these activities. Teachers should be around their students as facilitators to assess ideas and give students guided questions so they can check students' ideas and work (Balfakih, 2010).

Science process skills are supported by the teacher's role in determining instructional media that are appropriate to student characteristics. One of the supporting components for achieving learning objectives is the use of learning media (Fembriani, 2022). The function of the media can be achieved well, if the understanding of the basic concepts is good (Iriani, 2019). Children at the elementary school level will more easily understand something in accordance with reality or concrete and rely on their five senses (Budiningsih, 2015; Jamaris, 2015). Learning media is a tool that can help the learning process because it is related to the senses of hearing and sight (Wibawanto, 2017). Learning media is designed to provide a real picture that allows the teacher to visualize a material (Erviana, 2019).

There are many learning alternatives that elementary school teachers can choose to help improve students' science skills. There are so many learning models, but the variations made by the teacher are very limited. This is caused by the limitations of the teacher's perception in choosing the right lesson. The purpose of this study was to analyze teacher perceptions of the science process skills of elementary school students and the learning media needed by students according to the learning environment and characteristics. This needs analysis is expected to assist teachers in cultivating students' science process skills, finding learning media that can complement the main book. The formulation of the research problem is (1) What is the teacher's perception of science process skills and their relation to government policy? (2) How is the application of science process skills in learning in elementary schools?; (3) What is the role of learning media in growing science process skills in elementary school students?

METHOD

The research was carried out using descriptive qualitative methods using a qualitative approach. The data collection technique was carried out by combining the results of interviews and questionnaires, then processing inductive data analysis (Sugiyono, 2019). This qualitative research can produce data and process the data which is descriptive in nature. In connection with the flexible and open nature of qualitative research, the types and methods of data collection in qualitative research can be said to be very diverse which can be adapted to the problems, research objectives, as well as the nature of the object being studied.

Research subject

The selection of subjects in the study was carried out by first analyzing the problem which was carried out by the authors at a number of elementary schools. After carrying out the analysis activities, the research subjects were 9 class teacher respondents who carried out science learning activities in elementary schools. Resource persons were taken from various elementary schools which were considered to represent a number of problems regarding teacher perceptions in cultivating science process skills in elementary schools through instructional media.

Instrument

In this study the instruments used for data collection were a needs analysis questionnaire and an interview guide. The needs analysis questionnaire was adopted from research that had been carried out previously by Novianty et al. (2018). The following is a grid of interview guidelines and the instruments used (Table 1).

Table 1. Interview Guidelines

Aspect	Indicator
Science Process Skills	Basic perception
	Application of Learning
	Constraint
The Role of Learning Media	Media currently used
	The teacher's efforts to fulfill the learning media
	Learning support media needs

The interview guidelines in Table 1 will then be used to develop teacher interview instruments to determine perceptions of science process skills and learning media needs. The interviews conducted were of a semi-structured type, with the aim of finding more open issues. In connection with the nature of qualitative research which is holistic so that research will look at the whole including aspects of places, actors, and activities that interact synergistically as like Table 2 (Sugiyono, 2017).

Table 2. Preliminary Analysis Questionnaire Grid

Aspect	Indicator of Questions
Teacher's understanding of SPS and its relationship to government policy	A1, A2, A3, A4
Application of SPS Learning in Elementary Schools	B1, B2, B3, B4
The Role of Learning Media	C1, C2, C3, C4

These grids will then be used as guidelines for preparing the questionnaire. Each item is followed by two answer choices, namely agree and disagree.

Data analysis

Questionnaire analysis uses the Guttman scale with a number of statements of opinion or opinion regarding a subject, namely agreeing or disagreeing with several opinions submitted with a score of 1 for the answer "yes" and a score of 0 for the answer "no" (Widyoko, 2014). The data analysis used in this study is the Miles and Huberman model, which includes data reduction, data display, and making conclusions (conclusive drawing/verification) (Sugiyono, 2015). From this data collection, conclusions can only be drawn from the research conducted (Rosilia et al., 2020).

RESULTS AND DISCUSSION

Science process skills are an important component of student learning, because they involve cognitive/intellectual, manual and social skills (Rustaman, 2003). SPS activities help

students to progress from a concrete thinking level to a more complex thinking level that puts forward higher-order thinking skills in 21st century skills (Turiman et al., 2012).

Based on the analysis of interview data and questionnaires, data was obtained about teachers' perceptions of SPS through the availability of learning media in elementary schools. The data is divided into three aspects, namely: (1) Teachers' perceptions of science process skills and their relation to government policies, (2) Application of SPS in elementary school learning, and (3) Learning media needs

Teachers' Perceptions of SPS & Its Relation to Government Policy

Based on the results of the questionnaire analysis, it is known that there is a teacher's understanding of SPS and its relation to applicable government policies related to the current curriculum. There are several schools that are still implementing the 2013 curriculum and some others are already using the independent curriculum. This aspect consists of six statement items in a questionnaire filled out by the teacher. The results of Aspect A data analysis can be seen in Figure 1.

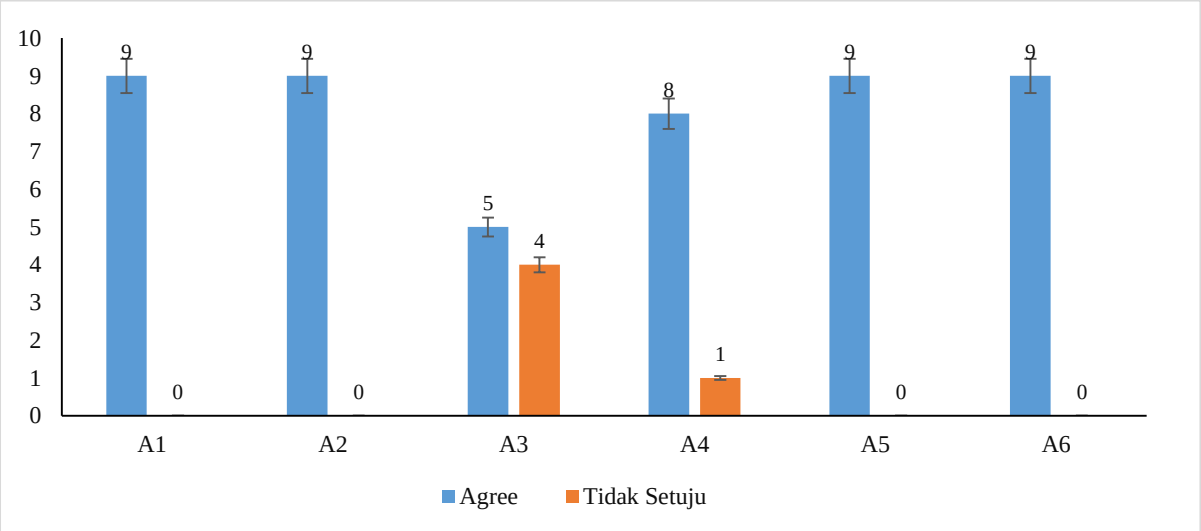

Figure 1. Analysis of Teacher Perception Aspects

Figure 1 shows teachers' understanding of SPS and its relationship to government policy. Based on data analysis on point A1, it appears that 9 teachers agree that SPS is a skill that needs to be developed in elementary school learning. Point A2 shows that all teachers agree that teachers must understand the SPS concept in SD. Point A3 shows that 5 teachers agree that currently the teacher already has the SPS concept quite well, while the other 4 teachers disagree. Point A4 shows that 8 teachers agree that SPS development is in accordance with 21st century skills and 1 teacher disagrees. At point A5 all teachers agree that the SPS development has been supported by the 2013 curriculum and the independent curriculum. In line with that point A6 all teachers agree that the application of SPS plays a significant role in thematic learning.

Data in the form of percentages shows that 100% of SPS needs to be developed in elementary school learning, 100% of teachers must understand the SPS concept, 55.6% of teachers already have the SPS concept quite well, 88.9% of SPS is in accordance with 21st century skills, 100% agree with SPS already supported by the applicable curriculum and 100% SPS enough to play a role in thematic learning.

Science process skills will be greatly influenced by the teacher's understanding of the science field, because it will have an impact on how science is done in class (Ambross et al., 2014; Wenham, 2005). Based on the results of the questionnaire, it can be seen that SPS is important to be applied at the elementary school level. Teachers as one of the supporting factors for SPS (Osman & Vebrianto, 2013), based on data analysis, most of them already understand

the SPS concept quite well and know its relation to the Indonesian government's policies regarding the current curriculum.

The 2013 curriculum emphasizes the meaningfulness of an authentic learning process (Kurniaman & Noviana, 2017). Adjusting to the demands of the independent learning curriculum is important for students to have science process skills and reasoning abilities. The two ongoing curricula are aligned with the implementation of the basic SPS. Students are able to learn science in a meaningful way through exploring science process skills based on a constructivist approach (Turiman et al., 2012). The meaningfulness of learning will continue because individuals are able to find, interpret, and assess based on different conditions (Bilgin, 2006). Based on interviews with teachers A and E, they have the same opinion, namely through SPS children can apply various scientific methods in the practice of everyday life. SPS Basic science process skills in the form of observation, measurement, classification, inference, prediction, and communication are able to integrate thematic learning and 21st century skills that can increase student competitiveness. Students are accustomed to thinking scientifically and accustomed to communicating, thinking critically and creatively through solving various kinds of problems presented by educators (Priyani & Nawawi, 2020). Through communication skills, according to teacher D students are able to draw conclusions and convey their findings.

However, this has not yet been fully implemented. According to the results of the teacher's interview, it was stated that Indonesian education is focused on the process of memorizing, not understanding, and learning as much as possible, not going deep into it. So it is very important to master science skills for students so that their thinking processes are not just about rote memorization. This statement is supported by the results of research conducted by (Yuliati, 2016) which states that science learning so far has a tendency to only hone aspects of remembering and understanding, not training students' skills in inquiry. Actually learning will be more meaningful, if students are able to find their own concepts learned through a process of observational activities that can develop students' process skills.

Application of SPS Learning in Elementary Schools

Based on the results of the questionnaire analysis, it is known that there are still some obstacles to learning using SPS. This aspect consists of six statement items in a questionnaire filled out by the teacher. The results of the B aspect data analysis can be seen in Figure 2.

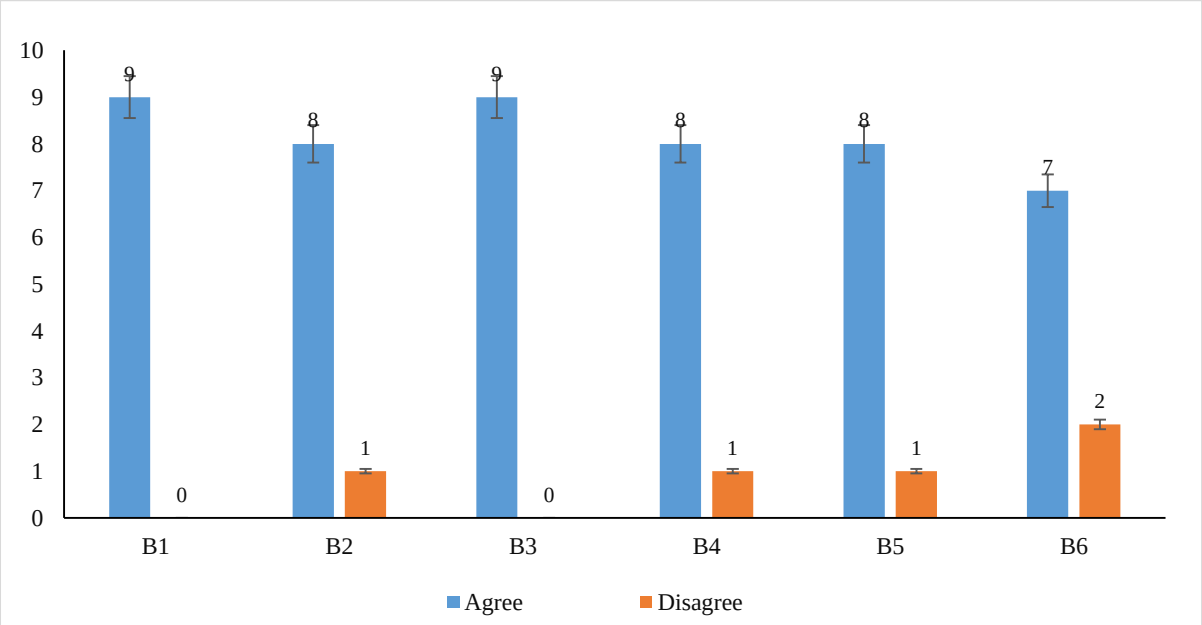

Figure 2. Analysis of the Aspects of the Application of SPS Learning

Figure 2 shows the application of SPS in learning in elementary schools. Based on data analysis on point B1, it can be seen that 9 teachers agree that they need to master learning

strategies to instill SPS in elementary school students. Point B2 shows that 8 teachers agree that student-centered learning currently accommodates SPS for elementary school students, and 1 teacher disagrees. Point B3 shows that 9 teachers agree that students' understanding of concepts can be increased through SPS-based learning. Point B4 shows that 8 teachers agree that students have been involved in learning through observation, measurement, classification, inference, prediction, communication, and 1 teacher disagrees. At point B5 it shows that 8 teachers agree that the obstacle to implementing SPS lies in the difficulty of designing appropriate lesson plans, and 1 teacher disagrees. At point B6 it shows 7 teachers agree that another obstacle is because students are rarely given the opportunity to understand the phenomena around them based on the concepts they have learned, and 2 other teachers disagree.

Data in the form of percentages shows that 100% of teachers need to master learning strategies that integrate SPS, 88.9% of learning is student-centered, 100% increases understanding of concepts through SPS, 88.9% of students are involved in basic SPS activities, 88.9% SPS constraints on the difficulty of designing learning, and 77.8% of students are rarely given the opportunity to understand the phenomena around them.

Based on the results of the questionnaire, it appears that teachers need to master SPS-oriented student-centered learning strategies. Learning strategies in understanding new conditions that make this very important in enabling students to develop understanding, and the ability to identify and use relevant scientific evidence in solving problems and making decisions (Harlen, 2017). Basic SPS learning through observation, measurement, classification, inference, prediction, and communication can improve students' understanding of concepts. So that SPS-oriented learning is designed so that students actively participate in the learning process (Bilgin, 2006). According to teacher H, they are directed to seek new knowledge and develop the knowledge they have, so that they are enthusiastic about participating in learning and learning objectives can be fulfilled.

But around 88.9%, it seems that there are still many teachers who have problems designing SPS-oriented learning. Another obstacle is indicated by around 77.8% because students are rarely given the opportunity to understand the phenomena around them based on the concepts they have learned. Through the results of interviews, several teachers also stated that they had not seen an increase in students' SPS. Therefore it is necessary to do further reflection to find the cause and solution.

The Role of Learning Media

Based on the results of the questionnaire analysis, it is known that learning media has an important role in supporting the continuity of SPS learning. This aspect consists of five statement items in a questionnaire filled out by the teacher. The results of the C aspect data analysis can be seen in Figure 3.

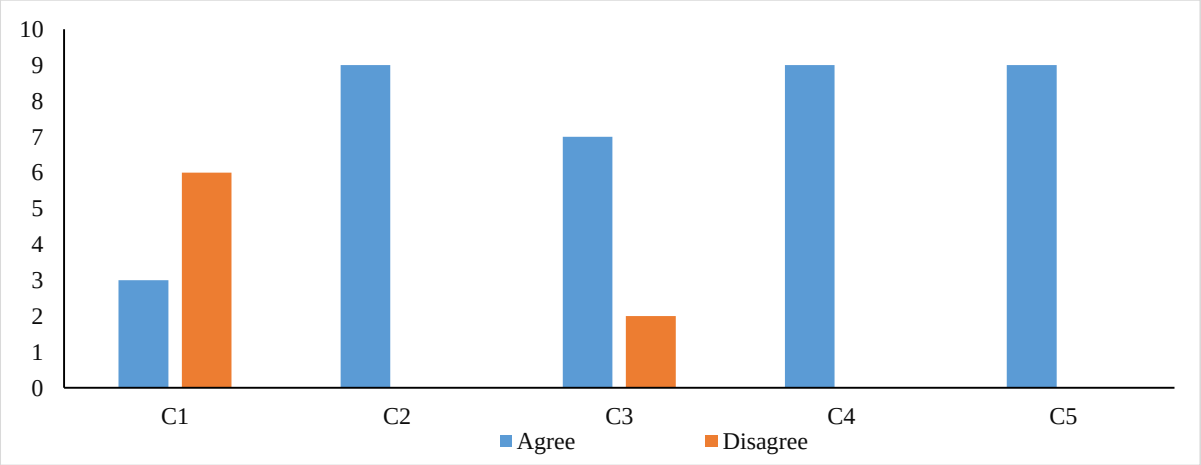

Figure 3. Analysis of the Aspects of the Role of Learning Media

Figure 3 shows the role of learning media to support SPS learning in elementary schools. Based on data analysis at point C1, it can be seen that 6 teachers did not agree that learning media had been available that supported SPS, and 3 other teachers expressed their agreement. Point C2 shows that 9 teachers agree that teachers need learning media that can support the implementation of SPS learning. Point C3 shows that 7 teachers agree that SPS is difficult to apply in distance learning. Point C4 shows that all 9 teachers agree that distance learning requires learning media facilities to support SPS learning. At point C5, 9 teachers agree that web-based digital learning media can facilitate the implementation of SPS-based learning.

Data in the form of percentages shows point C1 of 67%, there is no learning media that can support SPS. 100% required learning media to support SPS learning in elementary schools. What's more, 77.8% SPS is quite difficult to apply to distance learning. So that 100% of teachers need media facilities that can be used in distance and face-to-face learning, and 100% of teachers agree that web-based media can be another supporting learning resource.

Process skills need to be developed through direct experience as a learning experience. Through direct experience/concrete reality, students can better appreciate the processes or activities that are being carried out (Priyani & Nawawi, 2020), and help students gain clearer conceptual understanding (Rowland, 1987; Yuliati, 2016). They use all their senses to gather information about objects or events in their environment (Monhardt & Monhardt, 2006). However, there are some concepts that are less likely to be observed directly with the five senses of students, or to present real objects in every lesson. So that the processes that occur related to the material cannot be visualized as a whole. In addition, distance learning limits students from exploring their surroundings directly.

Based on the results of the questionnaire, 67% showed that media facilities were not yet available. All teachers agree that learning media are needed that provide direct experience, and can support SPS learning in elementary schools. In line with the results of a study conducted by Ambross et al. (2014) that one of the obstacles to PPP is the lack of learning resources and supporting equipment.

Through the results of interviews with teachers, it is possible to deepen what kind of media is suitable for implementing SPS in both distance learning and face-to-face learning. According to teacher B, the media can cover all indicators in the science process itself. Equipped with the opinion of teachers C and I stating that the media is concrete so that students can understand it. So that media that can be conditioned for distance and face-to-face learning based on questionnaires and interviews, all teachers agree that web-based media is another learning resource. This is because web media has the flexibility to be accessed anywhere and anytime. According to Osman & Vebrianto (2013) SPS learning is best done using learning media, both web / laboratory based. Web-based learning provides material knowledge, opportunities for training and practice, concrete visualization through 'direct' and simulated activities (Rohaida & Kamariah, 2005).

The use of media in the implementation of learning activities can make students more motivated to learn. This is in accordance with the statement expressed by Nugraheni et al. (2019), that motivated individuals or students are students who have a focus on the importance of effort and persistence in learning. The availability of media will also enable students to participate more actively in the implementation of learning activities.

CONCLUSION

Based on the results of the research that has been carried out, it can be concluded that (1) Most of the teachers already understand the SPS concept quite well and know its relation to the Indonesian government's policies regarding the current curriculum. (2) Science process skills are needed for elementary school students to understand a science concept. (2) The need for a companion learning media that can facilitate as a support for learning science process skills. (3) Science learning media based on the characteristics of elementary school students can

develop science process skills. (4). The science learning media used can be developed in digital form to facilitate the online and offline learning process.

The results of this study can be used for further research, namely to develop companion learning media that are in accordance with the characteristics of elementary school students. The learning media developed must have broad material so as to be able to support the characteristics of elementary school students in order to be able to carry out basic SPS activities (observation, measurement, classification, inference, prediction, and communication) which can be used both at school and at home. Web-based media is a good container because it can be displayed digitally and accessed from anywhere. Learning media as a companion can strengthen students' understanding of material and alternative solutions in developing students' science process skills..

RECOMMENDATION

As for the suggestions from the research that has been carried out, one of them is that teachers can use learning media as a means to be able to involve students actively in the implementation of learning activities. Through the use of learning media that are interesting and in accordance with the characteristics of elementary school students, it is hoped that students will be able to develop science process skills.

Through the results of this study it is still possible for further researchers to focus only on the independent curriculum. In addition, it is necessary to carry out further research on broader learning media so that the implementation of education is getting better in an effort to develop students' science process abilities, especially at the elementary school level.

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