



Development of a Rational Decision-Making Learning Model Based on Socioscientific Issues for Students' Information Literacy. Is It Effective?

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Abstract. Challenges on a global, national and local scale regarding social and environmental problems caused by developments in science and technology are becoming more complex day by day. Therefore, this research aims to develop a learning model for rational decision making based on socioscientific issues to improve the information literacy of elementary school students. This research method uses the R & D method with stages modified into eight stages. The instruments used in this research were model validation sheets and student information literacy observation sheets. The research results show that the decision-making learning model based on socioscientific issues is considered to be able to be used in elementary school learning and is effective in increasing the information literacy of elementary school students.

Keywords: Rational Decision-Making Learning Model, Socioscientific Issues, Information Literacy

1 Introduction

The challenges on a local, national and global scale regarding social and environmental issues faced by today's society are becoming more complex day by day and need to be understood and resolved. [1], [2]. Several challenges related to social and environmental issues include environmental pollution, scarcity of natural resources, global warming, floods, landslides and other natural disasters caused by humans. [3]. These challenges include socioscientific issues because they have social, scientific and technological aspects [4].

If these challenges are allowed to continue, they will become a real threat to humans because humans will not be separated from their dependence on the environment. Therefore, it is important to build a society that has the capacity to overcome these problems [5]. The society in question is a society that has 21st century skills. The 21st century skills related to these challenges are information literacy [6]. Information literacy is an individual's awareness of information needs and the ability to seek information from various sources which is then identified, evaluated and communicated to solve problems [7]. In the context of socioscientific issues, individuals who have good

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information literacy will be able to solve problems related to socioscientific issues based on the results of analyzing facts and information, preparing alternative solutions, and evaluating alternative solutions so that the best solution is selected.

However, based on Kominfo data [8] survey results in 34 provinces regarding information sources frequently accessed by the Indonesian people, data showed that 76% were via social media, 14% via official government websites, 8.4% via print media (newspapers, magazines, etc.), and 1.16% do not access information at all. This shows that the information seeking ability of Indonesian people is still dominated by searching for information on social media and there are still people who never access information at all. Other data from Kominfo [8] regarding information literacy as part of the digital literacy sub-index is in the lowest category, namely 3.17 compared to the communication and collaboration sub-index, security sub-index, and technological capability sub-index.

This data is strengthened by the results of interviews with elementary school teachers in the city of Cimahi, West Java province regarding information literacy which shows that student involvement in searching for and using information other than textbooks in learning is still low, namely from the 103 teachers interviewed data was obtained. 48% of teachers have involved students in seeking information from various sources other than textbooks and 52% of teachers have never involved students in seeking information from various sources other than textbooks. If this is allowed to continue, it is feared that students' information literacy will not develop well and challenges on a local, national and global scale regarding socio-scientific issues will be difficult to understand and resolve.

One of the subjects that is considered to be able to train information literacy to solve problems based on socioscientific issues is social studies learning because social studies learning is related to socioscientific issues [9] This is in accordance with one of the main objectives of social studies learning, namely to create good citizens who have the ability to make decisions based on information and facts [10], [11]. Social studies learning which is considered to be able to train information literacy is social studies learning in accordance with the tradition of social studies as rational decision making and social action which aims to train students to make rational decisions based on valid facts and information and be able to act in accordance with these decisions. Apart from being in accordance with this tradition, social studies learning that can train information literacy is learning that uses a rational decision making model because the rational decision making model invites students to search for information, use facts and information, analyze the facts and information, and use step by step procedures. steps to take decisions in solving problems [12].

Previous research on socioscientific issues, namely research by Dolan et al., [13] entitled using socioscientific issues in primary classrooms, the results show that socioscientific issues can be used to increase scientific literacy in fifth grade elementary school. Students benefit from argumentation, and socioscientific issues provide a successful framework for increasing their science content knowledge. The next research regarding socioscientific issues was carried out by Yerdelen et al., [14] *promoting preservice teachers' attitudes toward socioscientific issues results show that socioscientific issues courses provide the same benefits for preservice science teachers and preservice social studies teachers in terms of interest and usefulness in socioscientific issues, liking socioscientific issues, and anxiety towards socioscientific issues. Meanwhile,*

previous research on information literacy by Wade et al., [15] berjudul developing information literacy skills in elementary students using the web-based inquiry strategies for the information society of the twenty-first century The result is that the information literacy skills of elementary school students using web-based inquiry strategies have increased. Students have the ability to search, analyze, evaluate and use information well. Previous research by Artmann et al., [16] entitled elementary school students' information literacy: instructional design and evaluation of a pilot training focused on misinformation. Learning using the inquiry model is able to have a positive impact on students' information processing abilities, especially in sorting appropriate and inappropriate online news. Apart from that, learning using the inquiry model is well received by students so that learning can run well and be fun.

Based on various expert findings and the results of preliminary studies, it was found that there has been no development of a rational decision-making learning model based on socio-scientific issues that is capable of involving students in information search, analysis, evaluation and use of information based on socio-scientific issues so that elementary school students' information literacy to be better. Therefore, in this research, research will be conducted that examines the development of a learning model for rational decision making based on socio-scientific issues in increasing the information literacy of elementary school students.

2 Method

This research uses the Research and Development method or better known as R and D which was adapted from Borg & Gall. R&D is the process used to develop and validate educational products. The results of development research are not only the development of an existing product but also to find knowledge or answers to practical problems. R&D is the process used to develop and validate educational products. The results of development research are not only the development of an existing product but also to find knowledge or answers to practical problems [17]. Apart from this statement, another fundamental reason for choosing the R&D method in this research is because the stages of the R&D research method can be modified based on needs and conditions in the field. [18] so that the R&D stages in this research were modified into eight stages, namely 1) research and initial information collection; 2) planning; 3) initial product development; 4) initial trial; 5) initial product revision; 6) field trials; 7) product revision; and 8) dissemination and implementation. The product produced in this development research is a learning model for rational decision making based on socioscientific issues to increase the information literacy of fifth grade elementary school students in Cimahi City. The participants in this research were fifth grade elementary school students and teachers located in two schools in the city of Cimahi. The research instruments used in this research were learning model validation sheets and observation sheets in accordance with information literacy indicators and the data obtained was analyzed qualitatively.

3 Results and Discussion

The research results are presented in three parts, namely the results of model expert validation of the model developed and the effectiveness of the rational decision making learning model based on socioscientific issues on students' information literacy. The detailed results of the research are as follows. The learning model for rational decision making based on socio-scientific issues was developed by paying attention to and considering aspects of the learning model which consist of basic thinking, objectives and assumptions, model syntax, social systems, reaction principles, application, support systems, instructional impacts and accompanying impacts. [19]. The decision-making learning model based on socioscientific issues is appropriate using the philosophical foundation of social reconstruction and Ki Haja-jar Dewantara's educational philosophy to be able to provide opportunities for students to create solutions to social problems and the teacher's role is to help students examine major social problems and controversial issues. [20], [21]. The syntax of the rational decision-making learning model based on socioscientific issues that is being developed consists of seven steps, namely 1) *analyze concepts*; 2) *identify a problem that requires a solution*; 3) *create alternative solutions based on facts*; 4) *analyze alternative solutions*; 5) *selecting best possible solution*; 6) *implementing decision for solution*; and 7) *evaluate implementing decision*.

The results of expert validation consisting of six validators suggest that the rational decision-making learning model based on socioscientific issues can be used in elementary school learning with several minor revisions. The results of the validation of the learning model developed are as follows:

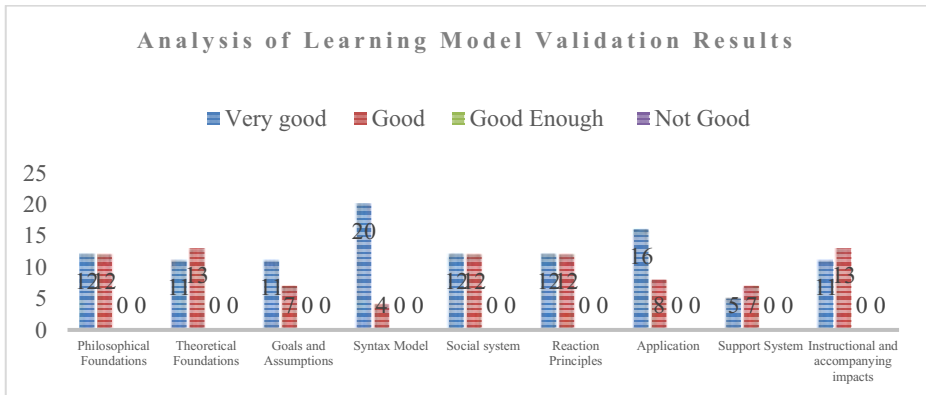


Fig. 1. Analysis of validation results of the rational decision-making learning model based on socioscientific issues

After the learning model was revised according to input from experts, the learning model based on socioscientific issues was tested in the field to determine its effectiveness on students' information literacy and the results of applying the rational decision-making learning model were included in the effective category in increasing the information literacy of fifth grade elementary school students. in the city of Cimahi with detailed data analysis as follows:

Table 1. Analysis of Student Information Literacy

Meeting	Average Observation Percentage Value	Criteria
1	49 %	medium
2	61 %	high
3	70 %	high
4	77 %	high

Based on the data in table 1, students' information literacy during learning using a rational decision-making model based on socioscientific issues has increased from the first meeting to the fourth meeting. Therefore, learning using a rational decision-making learning model based on socioscientific issues is included in the effective category in increasing the information literacy of fifth grade elementary school students at Karangmekar Mandiri 1 State Elementary School. Meanwhile, the results of the analysis are more detailed regarding each information literacy indicator for each meeting is as follows.

Table 2. Analysis of each information literacy indicator

Meeting	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5
1	49 %	51 %	55 %	42 %	49 %
	Medium	Medium	Medium	Medium	Medium
2	80 %	74 %	55 %	44 %	50 %
	High	High	Medium	Medium	Medium
3	82 %	87 %	75 %	52 %	52 %
	Very High	Very High	High	Medium	Medium
4	89 %	82 %	77 %	72 %	57 %
	Very High	Very High	High	High	Medium

Based on Table 2 regarding the results of the analysis of each indicator of information literacy at each meeting, namely for the first indicator, awareness of information needs from the first meeting to the fourth meeting has increased. Awareness of students' information needs during the learning process at the first meeting was not very good because students were not used to working on Student Worksheets which required searching for information from various sources during the learning process. However, at the second to fourth meetings, when students were guided and given the opportunity by the teacher to work on students' worksheets in groups, the results of observations were that students began to show awareness of the need for information to better understand the material and complete the students' worksheets that were given.

The second indicator, namely students' ability to access information, is the same as the first indicator, namely students at the first meeting have not demonstrated the ability to access information from various sources well. At the first meeting, students focused more on searching for information from textbooks and teaching materials that had been provided, only a few groups started trying to access digital information from the internet. However, at the second meeting the students were guided by the teacher to search for information from the internet and the students got an idea of how to search for information from the internet through their friends, so the ability to access information

from the second meeting to the fourth meeting showed improvement in a better direction.

For the third indicator, namely the student's ability to use information for a specific purpose at the first meeting compared to other indicators, it shows a fairly good initial ability, meaning that students already know the purpose of searching for information and the use of the information obtained. From the first to the fourth meeting, students showed improvement in using information for certain purposes well. Meanwhile, the fourth indicator, namely students' ability to evaluate information and its sources at the first meeting compared to other indicators, shows the lowest initial ability. This is because students are accustomed to using information from textbooks and teaching materials so that students feel that the information they obtain is good and the source is clear. Therefore, at the first to fourth meetings, students' abilities on this indicator did not increase significantly. When students obtain information from the internet, students do not properly criticize the content of the information and the source of the information, so students immediately write the information they obtain on the students' worksheet.

For the fifth indicator, namely students' ability to use information effectively compared to other information literacy indicators, it shows the lowest increase. At the first to fourth meetings with students, when they had obtained information from textbooks, teaching materials, and from the internet, students immediately wrote it on the students' worksheets exactly the same without any prior analysis and evaluation so that the information used was less effective.

Based on the results of observations in the VA class which consisted of seven groups, five groups worked on student worksheets regarding identifying problems from the internet and the other two groups identified problems from the teaching materials that had been provided. Meanwhile, in the VB class which consists of seven groups, only four groups appear to actively search for information from the internet and the other three groups seem to prefer searching from teaching materials.

Another finding in the first learning activity was that each group when presenting the results of their worksheet work, the students did not seem confident enough because most of the groups presented it in a low voice. Therefore, there is a need for special strategies to stimulate students to be more confident in learning activities, one of which is providing awards in simple and varied forms but which are felt to be meaningful by students.[22]. This shows that it is easier for teachers to direct students to search for information through the media that has been provided, this situation is in line with the theory of development of elementary school students' thinking which places greater emphasis on concrete learning activities that can be seen and used by students. [23]

At the stage of working on the student worksheet regarding creating alternative solutions, all groups in classes VA and VB seemed more happy to look for alternative solutions from the internet than from books and from other sources. However, based on the results of observations, when each group had found alternative solutions from the internet, all student groups immediately wrote all the information on the internet into student worksheets without any further process of sorting the information. Then in the fourth syntax, namely analyzing alternative solutions, most students prefer to do it by discussing so only a few access the internet. At this stage students begin to adapt to the habit of searching for information from the internet. This learning activity is the result of the teacher's guidance activities at each meeting. The important role of teachers in

directing, guiding and demonstrating activities has an important role in changing students' learning habits, because students feel comfortable carrying out learning activities that they are used to doing.

When students discussed choosing the best solution, it turned out that it did not take as long as previously thought, most of the student groups answered quickly which solution was considered the best. At the design stage of implementing the solution which is included in the sixth syntax activity, most groups of students access the internet to find information about what plans are in accordance with the decisions they have chosen. However, there are some students who have difficulty writing keywords when searching on the internet. Students' ability to choose a solution is indeed something that will be easier than searching for and analyzing information. This is stated in the development stage of Bloom's taxonomy that choosing or making choices is easier when compared to searching and analyzing activities. [24].

However, another finding was that the students' worksheets regarding implementing decisions did not yet have a section for inserting documentation so that the implementation of decision-making activities did not appear in more detail. Documentation during student decision-making activities is very necessary, because the student decision-making process is not the result of a written answer, but is demonstrated through the analysis process to deliver the decision. Documentation is something that shows the validity of data in student learning activities.

4 Conclusion

Based on the research results and findings during research implementation, it can be concluded that the decision-making learning model can be used in elementary school learning and is effective in increasing the information literacy of fifth grade elementary school students.

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