

Teachers' Perception Regarding Integrated Science Learning and Science Literacy

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Abstract—This article aims to describe the perception of science teachers regarding integrated science learning and science literacy. This survey involved 60 science teachers from the two districts at West Java. Educational qualifications of the teachers involved in this program were undergraduate physics, chemistry, and biology education. In addition, they already have at least 5 years of experience teaching in class. The procedure for collecting data in this development program was carried out through teacher interviews and questionnaire filling. This study shows that teachers did not believe to teach integrated science learning because non-linear scientific background, a lack of mastery of science concept and the availability of integrated science teaching materials is very limited. Furthermore, majority of teachers argue that scientific literacy is the ability of students to search for various sources of science concepts. Therefore, program professional development of science teachers was needed, especially developing competencies of science teachers to teach integrated science in classrooms, strengthening a mastery of scientific disciplines, strengthening the concept of scientific literacy and providing it to students.

Keywords—*integrated science learning; science literacy*

I. INTRODUCTION

Today, teaching of science cannot be taught partially, but is multidisciplinary in nature that is closely related to engineering, mathematics and technology. The National Research Council (NRC) even made a standard of science education that emphasized the application of scientific ideas and engineering to learning science in schools [1]. In fact, NRC also stated that science teaching needs to integrate core ideas in science and engineering both interdisciplinary and trans-disciplinary [1]. These ideas can be interpreted that science education should emphasize scientific exploration and experimentation, not give long lectures and expect students to memorize a list of facts. Therefore, science education as part of education have an important role to prepare students who have science literacy, which is capable of critical thinking, creative, logic, and take the initiative in responding issues in society caused by the impact of the development of science and technology [2].

Science literacy is one of the goals of science education [3]. Lawson states that students who are literate to science have an understanding of the nature of science and scientific reasoning

[4]. Science literacy can be interpreted as developing the ability to creatively utilize relevant evidence-based scientific knowledge and skills, especially its relevance in daily life and career, in solving scientific problems, and making responsible decisions [5]. Students who are science literate are expected to have critical thinking skills and evaluate their knowledge to do problem solving and decision making [6].

Some research results show that students experience difficulties in using their knowledge for decision making processes on social issues [7-9]. This condition illustrates that science literacy is not yet inherent in students. His critical and reasoning thinking skills are still weak especially when responding to issues in everyday life.

The assessment of the Program for International Student Assessment (PISA) in 2015 showed that Indonesia obtained an average of 403 scientific literacy scores with an average score of all 493 participants [10]. This data can be interpreted that Indonesian students are still weak in how to apply mastery of science both as a product of knowledge and body of knowledge into applied technology. The lack of science literacy teachers contribute toward students' low scientific literacy [11]. Therefore, the development of students' scientific literacy cannot be done if the teacher's understanding of scientific literacy is still low. The teacher's understanding toward nature of science also important, because this competence influence science teaching in the classroom.

This article will describe the perception of science teachers regarding the implementation of learning science in schools, the integration model, and the concept of scientific literacy. The information obtained will be used as a reference in the science literacy-based teacher development program.

II. METHOD

This survey was conducted for junior high school science teachers in 2 West Java regencies. The survey involved science education practitioners from one of the private universities in the city of Bogor, the organization of science teachers and heads of education offices in 2 regencies, West Java. Science education practitioners involved in this survey have more than 10 years of experience in science education. Practitioners also have expertise in the field of learning innovation, science teacher training, and learning assessment. The survey was

conducted when the science teachers had no teaching and learning activities in schools, besides that the teachers involved in this program had received recommendations from the head of the department and the head of the school where they worked. Each school recommends 2 science teachers to take part in this activity.

The program was attended by 60 science teachers, consisting of 46 women and 14 men. All the teachers involved have already qualified as graduates of education. As many as 40 teachers are from behind biology education, 5 teachers are from behind physics and the rest are from chemistry. 80% of teachers have received educator certificates and 20% still have not received a certification program. On average they have taught more than 5 years. All teachers involved in this program have never taught science in an integrated manner. All of the teachers involved have on average received training programs organized by the Ministry of Basic Education. The procedure for collecting data in this development program is carried out through teacher interviews and questionnaire filling.

III. RESULTS AND DISCUSSION

The teacher's perception of integrated science learning and scientific literacy can be seen in Table 1.

TABLE I. THE TEACHER'S PERCEPTION OF INTEGRATED SCIENCE LEARNING AND SCIENTIFIC LITERACY

	Teachers' Perception
Implementation of integrated science learning in schools	<p>The teacher states that integrated science learning is difficult to implement in schools for various reasons, including relating to:</p> <ul style="list-style-type: none"> • Scientific backgrounds that are not linear with those taught • Mastery of concepts in physics, biology and chemistry is still low • Supporting facilities for science practice are still not supportive • Teaching material of integrated science learning is limited
Model of integrated science learning	<ul style="list-style-type: none"> • 65% of teachers agree that integrated science learning at school only focuses on integrating science concepts such as physics, chemistry and biology. • 100% of teachers state that high-level thinking skills are a part that can be integrated into science learning
The concept of science literacy	<ul style="list-style-type: none"> • 18% of teachers stated that scientific literacy is the ability to use scientific knowledge in solving problems in everyday life • 12% of teachers stated that scientific literacy is a science learning that focuses on the nature of science namely products, processes, and attitudes / applications • 70% of teachers state that scientific literacy is the ability to find information from various sources to understand the concepts of science and natural phenomena • 100% of teachers agree that science literacy needs to be provided in science learning at school.

Table 1 shows that the constraints of science teachers in implementing integrated science learning in schools are scientific background, confidence in teaching science, practical

tools and teaching materials. The data can be inferred that self-confidence in science-intensive teaching is an important factor in the science learning process in the classroom. Teachers who have pedagogical confidence will be effective in teaching science in class. This is in accordance with the study of Lumpe et al., which states that teachers who have attended training programs have confidence in teaching science, so that science learning in the classroom becomes effective [12].

In addition, the difficulty of the teacher in implementing integrated science learning is also influenced by his understanding of cohesive models. They assume that the integration of IPA only focuses on integration in science concepts (physics, chemistry and biology). Even though they realize that thinking skills can also be integrated in science learning. This data provides evidence that integrated science learning in schools is limited to combining concepts, but aspects of skills are often ignored.

The teacher's perception of scientific literacy (see Table 1) shows that most teachers do not understand the concept of scientific literacy. Though scientific literacy is the main goal of science education [3, 5, 13]. The understanding of science teachers about scientific literacy will affect the learning process implemented by teachers in the classroom.

The majority of teachers assume that scientific literacy is the ability of students to explain the phenomenon of science based on the results of processed information obtained from various sources. If the teacher's understanding is so, it can be predicted that the right direction of science learning according to the teacher is "students are only expected to be able to explain scientific phenomena based on relevant sources". This is very contradictory to the concept of scientific literacy and the purpose of science learning. Whereas the main purpose of science education emphasizes social goals, namely to encourage students to participate as citizens in decisions on socio-critical issues and decision making about developing issues in the community [14-16].

IV. CONCLUSION

Teachers' perceptions regarding the implementation of integrated science learning in schools are difficult because several factors include incompatibility of scientific disciplines, a lack understanding of science concepts and limited of teaching materials. However, science teachers stated that integrated science learning is very important to be implemented in class because it can facilitate higher order thinking skills and contextual learning. In addition, this study shows the findings that the majority of teachers argue that scientific literacy is the ability of students to search for various sources of science concepts. Its mean that the teacher does not understand the concept of scientific literacy which is essentially a measure of science learning achievement. Therefore, some findings from this study provide an opportunity for us as science education practitioners to create a science teacher professional development program. Professional development focuses on strengthening the competencies of science teachers in teaching integrated science in classrooms, strengthening content in scientific disciplines, strengthening the concept of scientific literacy and providing it to students.

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