

Preliminary research: Identification of Difficulty in Chemical Learning Based On Teacher and Student Perspectives

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ABSTRACT

The purpose of education is to create a society which has the scientific literacy skills. So that goal is reached it is necessary to teach and develop competencies that support skills. This study is a preliminary study in the identification of the problems perspectives by teachers and high school students in learning chemistry. The method used in this study is a survey method using a questionnaire. Respondents consisted of 10 teachers and 22 students senior high school in Bandung. From the results of the survey the problems perspectives by the students, interest and motivation in learning chemistry students is still low. It can be seen from the student questionnaire (question 1, 2, 3, and 4). In addition to low literacy student chemistry can be concluded from the results of the questionnaire related to the learning habits of students in applying chemistry in everyday life, 59.1% sometimes, 27.3% often, 9.1% and 4.5% always never. From the survey results the authors focus on three main issues in teaching chemistry ie, level of difficulty of the material, the selection of teaching and learning context model of chemistry in everyday life is not always delivered on the learning process. Teacher as a key component in education need to be equipped with a good understanding and skills to implement learning that can develop chemistry student literacy. Knowledge is always evolving as the development time, teachers are required to continually update the scientific study. Difficulties experienced teachers is the failure to trigger the birth of learning in students and led to the view that chemistry is a difficult lesson. Based on the results of the survey above, learning will be more meaningful if using social-scientific issues that are relevant to the material being taught in order to achieve educational goals.

Keywords: Preliminary research, chemical literacy, learning chemical

INTRODUCTION

Developments in science and technology today affects different spheres of life, including education. In contributing to the global world, one must be able to understand and process scientific information to explain the phenomena that occur around everyday life. In the 19th and 20th century science learning goals of the school is to establish the scientific literacy of students. According to research, scientific literacy is highly correlated with the content / concepts of science (Stefanova et al, 2010). Multidimensional scientific literacy, not only the understanding of scientific knowledge, but more than that.

The definition of literacy is a chemical derived from the definition of scientific literacy and can be defined two main framework, namely the definition of PISA (the Program for International Student Assessment) in 1997 (OECD, 2015) and the definition Shwartz et al (2006) built on the basis of agreement between the scientists are , educator, and chemistry teacher (Rahayu, 2017).

Skills scientific literacy is a skill to understand and explain the phenomenon by using language skills, reading, and writing to mengavaluasi information and communicate ideas to the public, and applying scientific knowledge, the skills of reasoning and decision making process for dealing with problems in everyday social life (AAAS, 1993; Grabber, dkk.2001) the emergence of scientific literacy in the history of science,

Chemical literacy relates to the ability of students to understand the information, knowledge and facts in everyday life, as well as the ability to apply knowledge in everyday life. Past research has shown that students 'difficulties in using scientific evidence and make decisions on issues socioscientific and have nothing to do with the lack of chemistry students' literacy skills. Individual achievement in science knowledge and skills further and has implications for their readiness to face the utilization of advanced technologies in the future (OECD, 2013). Thus, to develop an understanding of science in the individual can begin to develop literacy in each individual chemical. Literacy chemicals should be developed in a way mendiversifikasi models / methods of learning, creating a core of knowledge, skills and attitudes systematically. Currently, the choice of learning leads to models / methods that encourage the formation of understanding of knowledge in the context of issues including knowledge in chemistry (Mozeika, Bilbokatte, 2010). Chemical literacy discusses the context of science and its role in the changes that occur in the world. Students need to have the ability to use scientific processes and habits of thinking in solving the problems encountered in daily life and to confront the problems of science and make decisions (Sadler, 2004). Therefore, the impetus for the chemical literacy requires moral and ethical implications of the issues socioscientific. With the socioscientific issues in education can be used as a tool to: (a) make science learning more relevant to students' lives; (B) a vehicle that directs the learning outcomes such as the appreciation of the nature of science; (C) increase the argument dialogue; (D) improve the ability to evaluate scientific information; and (e) include important aspects of scientific literacy (Sadler & Zeidler, 2004).

In line with the expectations of the Indonesian government listed in the 2013 revision of curriculum development rationalization, that membelajarkan science is not just a transfer of knowledge and skills but rather float just berliterasi science skills (Curriculum 2013 (Revised), 2016). Therefore, the need for renewal in the implementation process, with emphasis on science learning; (1) an understanding of how scientific evidence is used in science to construct an explanation that connects data and theory; (2) how to develop an understanding of the assessment criteria used in evaluating scientific evidence and explanations construction. Curriculum 2013 has provided a reference for the selection model / learning approach in accordance with the scientific approach. Learning in question include: problem based learning, project based learning, or discovery learning. Selection of learning approaches submitted to the teacher to adjust the characteristics of teaching materials. Teacher as a key component in education need to be equipped with a good understanding and skills to implement learning that can develop chemistry student literacy. Knowledge is always evolving as the development time, teachers are required to continually update the scientific study. Difficulties experienced teachers is the failure to trigger the birth of learning in students and led to the view that chemistry is a difficult lesson. Selection of learning approaches submitted to the teacher to adjust the characteristics of teaching materials. Teacher as a key component in education need to be equipped with a good understanding and skills to implement learning that can develop chemistry student literacy. Knowledge is always evolving as the development time, teachers are required to continually update the scientific study. Difficulties experienced teachers is the failure to trigger the birth of learning in students and led to the view that chemistry is a difficult lesson. Selection

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RESEARCH METHOD

The method used in this study is a survey method using a questionnaire. Respondents consisted of 10 chemistry teachers and 22 high school students in the city of Bandung. Information obtained from questionnaire collection was conducted from April to June 2018. Questionnaires contained a number of questions that extracted initial information about problems in chemistry learning faced by teachers and students.

RESULT AND DISCUSSION

a. Identify the problems faced by the teacher

The results of the answers given to the representatives of the three respondents on the questions asked related to chemistry learning to the teacher.

Table I. Representative responses from three respondents to questions related to chemistry learning

| No | Question | Answer |
|----|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | What chemical material do you think is difficult to understand to be conveyed to students in class XI ? | <p>Respondent 1: The material which in my opinion is very difficult is about chemical equilibrium, solubility and solubility results, because the material is very abstract.</p> <p>Respondent 2: Solubility and solubility results, because the characteristics of the material are abstract and require the ability to solve problems in the problem very high.</p> <p>Respondent 3: Chemical equilibrium, buffer solution, solubility and solubility results, the concepts are abstract and complex, including understanding concepts and counts, to understand them students must remember and relate to previous concepts.</p> |
| 2 | How do you teach the material in class during this time? | <p>Respondent 1: I present material by showing animated or powerpoint videos.</p> <p>Respondent 2: Making learning with group discussions, students are divided into several groups and discuss the material and look for references from other sources</p> <p>Respondent 3: group</p> |

| No | Question | Answer |
|----|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | discussion |
| 3 | When doing PBM in class, do you apply the learning model? If so, what learning model do you apply? | Respondent 1: Yes, but depends on the material taught. Adapted to the material and model used Respondent 2: Problem based learning Respondent 3: Yes, but more often with conventional learning |
| 4 | What are the steps or are there any specific things that you do when applying the learning model? | Respondent 1: The steps are in accordance with the learning syntax. Respondent 2: Initially give direction to start the learning model, form groups and provide a problem to solve Respondent 3: Attract students with quizzes or tell stories about surrounding phenomena |
| 5 | What difficulties or obstacles do you often encounter when the lesson takes place using the learning model? | Respondent 1: Facilities sometimes don't match, time and accuracy and there are some students who are less active Respondent 2: There are some students who find it difficult to follow the model, there are also some who do not want to cooperate with their group friends. As a result, it is dominated by high-ability students in PBM. Respondent 3: Lack of time, so learning cannot be completed according to the learning target. |
| 6 | What are the student learning outcomes after the learning model is applied? | Respondent 1: Increases, but sometimes the increase is not so significant Respondent 2: Some are increasing, some are fixed. Depending on students' learning interests and students' efforts in mastering teaching materials. Respondent 3: Increased enough |
| 7 | How is the ability of students to apply chemical learning in everyday life? | Respondent 1: Still lacking, some students are still not aware of the connection between learning and daily life. Respondent 2: Some materials, such as acid bases and colloidal systems Respondent 3: Most still include understanding concepts and calculations |
| 8 | In PBM do you provide scientific social issues as supporting teaching material? | Respondent 1: Only on acid-base material Respondent 2: Scientific phenomenon in everyday life Respondent 3: In some subject matter |

Based on the survey results presented in table 1 (question 1, it can be stated that in learning chemistry the material that is difficult to teach students is solubility and solubility results of 8 respondents (44.6%), chemical equilibrium 4 respondents (22.2 %), buffer solution 3 respondents (16.6%) and hydrocarbons 3 respondents (16.6%).

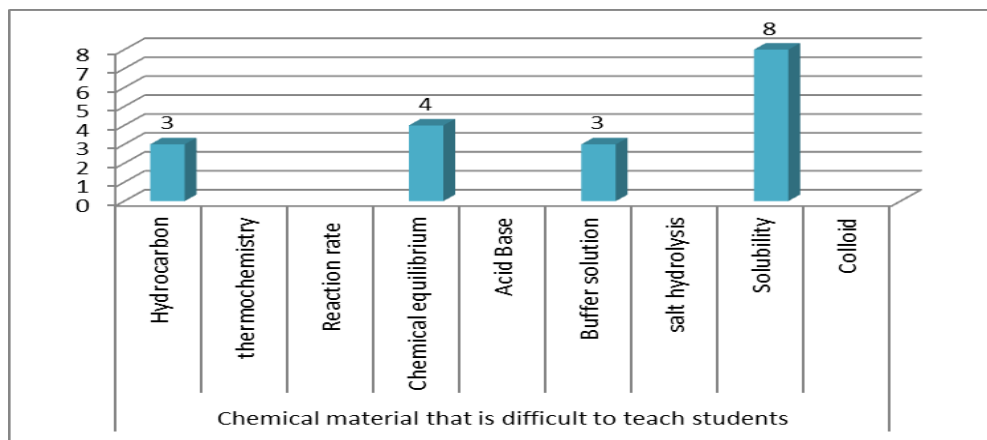


Figure 1. Chemical material that is difficult to teach students

During chemistry learning in class, the teacher certainly uses a learning model. Of all respondents, 50% used the lecture / conventional model, 20% discussion, 20% PBL and 10% STAD.

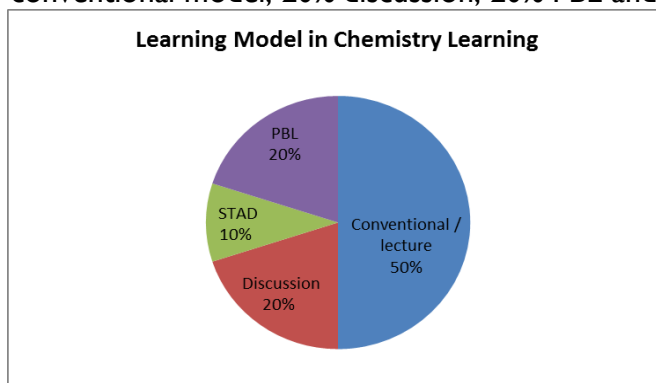


Figure 2. Learning Model in Chemistry Learning

b. Identification of chemical learning difficulties faced by students

Data from the answers given to students on the questions asked related to chemistry learning.

Table 2. The results of the identification of chemical learning difficulties faced by students

| No | Question | Answer | | | |
|----|----------------------------------------------------------------------------------------------------------|--------------------------------|---------------------|------------------------------------|---------------------------------|
| | | Very like / Very Good / Always | Like / Good / Often | Do not like / not good / sometimes | Very dislike / not good / never |
| 1. | Are chemistry subjects the subjects you like? | 9,1 % | 40,9% | 45,5% | 4,5% |
| 2 | Are you trying to understand chemistry lessons? | 27,3% | 50% | 18,2% | 4,5% |
| 3 | Do you often experience problems in chemistry learning? | 45,5% | 36,4% | 13,6% | 4,5% |
| 4 | In your opinion, what is the chemical material taught by the teacher at school? | 9,1% | 54,5% | 31,8% | 4,5% |
| 5 | Do teachers use varied learning methods such as lectures, discussions, and demonstrations when teaching? | 31,8% | 54,5% | 13,6% | 0% |
| 6 | Does the teacher give examples or real illustrations according to the subject matter? | 40,9% | 45,5% | 13,6% | 0% |
| 7 | How often do you apply chemical learning in everyday life? | 9,1% | 27,3% | 59,1% | 4,5% |

From the results of the survey problems faced by students, students' interest in learning chemistry is still low. This can be seen from the student questionnaire (questions no. 1,2,3 and 4). In addition, the students' low chemical literacy can be inferred from the results of the questionnaire (question no.7), namely the habits of students in applying chemical learning in daily life, 59.1% sometimes, 27.3% often, 9.1% always and 4.5% never.

There are many things that become problem factors in the teaching and learning process of teachers and students in chemistry learning. From the results of the survey above the author focuses on three main problems in chemistry learning, namely, first is the level of difficulty of the material, one of the material in class XI which is considered difficult to teach students is solubility and solubility products. This material is material that is considered to be abstract in nature and requires the ability to solve problems in a very high problem. Marlinda, et al. (2016), stated that the subject of solubility and the results of solubility is the subject of abstract and complex concepts, including understanding concepts and counts, so students must remember and associate with previous concepts. Diba, et al (2017), solubility material and solubility results that not only require deep understanding, but also are full of counts so that mathematical abilities are needed to solve problems that exist in the material.

Second, the learning model used in learning. Some teachers still use lecture / conventional learning, where teacher-centered learning. So that students are less motivated in chemistry learning. According to Buchari Alma (in Sari, 2012) the learning model is a learning plan that

describes the process taken in the teaching and learning process in order to achieve specific changes in student learning outcomes and behavior.

Third, the inability of students to apply chemical learning in their daily lives shows that the student's level of chemical literacy is still low. Referring to Liliyasi (2011), chemical education, which is part of science, is responsible for the achievement of the nation's literacy of science, because it needs to be improved in quality. Science learning is taught by emphasizing the process of giving experience to students in combining students' initial knowledge obtained from observing phenomena in the living environment providing a background in building students' initial knowledge. Each student certainly has a different interpretation of the experience gained in everyday life. In an effort to understand and engage in critical discussions about science and technology issues, according to Shwartz et al (2006) chemical literacy includes four domains, namely: 1) knowledge of chemical material and scientific ideas; 2) chemistry in context; 3) high level learning skills and 4) interest in problems related to chemistry, especially the social environment.

According to Toharuddin et al (2011), learning models that build scientific literacy are: integrated science approaches, community technology science approaches, contextual teaching learning, problem based learning and mastery learning. Another opinion about learning models that can build chemical literacy is stated by Ismail et al (2015), learning models such as problem based learning, project based learning, inquiry based learning, and learning cycle 5E (engagement, exploration, explanation, extension, evaluation). An approach that can increase students' chemical literacy is a learning approach where students are faced with a problem which then with the problem solving students learn various skills through investigation and thinking so that students can be guided in learning and solving problems. Problem-based learning will be very interesting for students if the problem used is a socioscientific issues that are close to students' daily lives. One chemical material that is closely related to social problems in everyday life is solubility and solubility products. This material which is considered abstract is very close to the scientific phenomenon that has become a problem in society, including water hardness, the formation of kidney stones in the body, the dangers of consuming carbonated drinks and the use of fluorine compounds in toothpaste. By mastering the concept of solubility and solubility results, students can explain scientific phenomena related to socioscientific issues.

Selection of the context of socioscientific issues in learning is felt to be needed to increase the relevance of chemical learning and improve student scientific literacy. Students in society are human beings who act as individual beings as well as social so it is necessary to take a decision in dealing with developing issues that are not necessarily true and in decision making will create a dilemma that also relates directly to moral values and ethics in society. The uniqueness of the character of socioscientific issues is what when applied as a context of learning can help students construct, transfer, and apply the concepts of knowledge and express moral attitudes to ethical issues. In addition, through socioscientific issues students can develop scientific literacy in evaluating the truth and solution of these problems. Therefore, integrating socioscientific issues in the chemical learning process can attract attention and motivation to better understand and construct students' concepts and improve students' scientific literacy.

Referring to previous research, Marks, et al (2009), found that a sociocritical and oriented approach to controversial problems regarding socioscientific and socioeconomic problems into chemical learning can improve students' scientific literacy. Klosterman, et al. (2010), found the use of the socioscientific curriculum to provide support for the use of SSI as a context for learning science content. Fibonacci, et al (2012), the development of Fun-chemistry teaching materials

integrated with socioscientific can improve students' scientific literacy and help students form the expected pattern of concept discovery in redox material. Subiantoro, et al. (2013), found that learning in the context of socioscientific issues had a better influence on changes or improvements in reflective judgment abilities compared to the usual learning applied by teachers. In addition, Handayani (2017), finding POGIL learning strategies in the context of socioscientific issues has a significant influence on understanding the nature of science and students' critical thinking abilities.

CONCLUSION

Based on the research that has been done, has identified difficulties experienced by teachers and students in learning chemistry. From some of the above problems are a major factor that inhibits the process of teaching and learning for teachers and students is the level of difficulty of the material, the model selection belajar learning in the process of teaching and learning context of chemistry in everyday life is not always delivered on the learning process. Teachers holding a big role in creating a conducive learning atmosphere and fun for students to get a student's learning experience. Teacher as a key component in education need to be equipped with a good understanding and skills to implement learning that can develop chemistry student literacy.

Knowledge is always evolving as the development time, teachers are required to continually update the scientific study. Difficulties experienced teachers is the failure to trigger the birth of learning in students and led to the view that chemistry is a difficult lesson. To create a society that has the scientific literacy skills, it can be done by inserting socioscientific issues as a context for learning with problem-based learning model.

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