A problem of chemistry book: The need to improve student’s science literacy with STSE approach

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Abstract. In this article, we explain the need for chemistry book developed by 4S TMD models on the level of science and literacy with STSE approach. Teaching materials are one of the determinants in the chemistry learning process, one of them is the concept of rate reaction. Rate reaction concept there are many applications in daily life. One suitable approach to use is the STSE approach. Teaching materials with the STSE approach help students reflect on the scientific, environmental, technological and social aspects of learning. Science literacy as an output of knowledge, and scientific processes. The instruments for data collection used in this study were structured questions and interviews. This research was conducted in 2 senior high schools, 2 vocational high schools with 12 chemistry teachers. The teacher structure question responses was analyzed descriptively for each item. Teaching materials currently available have not been able to increase students' interest in reading because their appearance is less attractive, material content is difficult for students to understand. Most teachers want teaching materials that are easily understood by students, full colour, contain many examples in daily life. So that it can improve students' scientific literacy. STSE-based teaching materials are expected to improve students' scientific literacy because contain content in life. STSE-based teaching materials are still rarely used because of the lack of availability of STSE-based teaching materials that can be used by teachers in learning. The results of this study are the basis for us in developing chemistry book by 4S TMD models on rate reaction to improve student’s science literacy with STSE approach that can be used in chemistry learning and teaching in upper high schools.

1. Introduction

One of the problems that we often encounter in the learning process is that which does not motivate students to learn [1]. The motivation to learn, the teaching and learning process will not take place well or in two directions. The learning process will take place well if there is two-way learning from the teacher and students [2,3]. Often times students are less motivated in learning because of the lack of deepening and mastery of concepts by their teacher [4]. To support the learning process and maintain student motivation in learning, one of which is teaching material, so the role of teaching materials is an influential thing in the learning process [5,6].

The presence of teaching materials can also help the teacher to determine what strategies are used in teaching the concept [7]. Science literacy of students is still low can be seen in everyday life, for example, there are still many students who measure body temperature near a fan or in an air-conditioned
room but the problem that is often faced by teachers is that the teacher has not been able to develop teaching materials that lead to an increase in students' understanding to obtain information to support the increase in student literacy [8-10].

Success in instilling technology and teaching strategies in learning science include lessons that are packaged from the environment to technology, most problems for teaching are related to the fact that students cannot describe content to achieve a complete concept of knowledge [12-15]. One that needs to be developed in chemistry learning is how students learn concepts, and ways of thinking in chemistry. But in reality, the implementation of chemical learning in schools tends to pay less attention to teaching materials made through approaches [16]. One approach in preparing teaching materials is the STSE approach.

The STSE approach is an approach that contains the concepts of science, technology, and society which offer answers to problems in science education [17-21]. Teaching materials made with the STSE approach can help students to improve students' scientific literacy, because scientific literacy has become a widely used term as an important characteristic that must be possessed by everyone to cover the purpose of science education [22-28]. The development of STSE-based teaching materials can improve students' scientific literacy because the presentation of materials was arranged based on daily life.

2. Methods
This study, the authors used a qualitative descriptive method that did not provide treatment and changes in the independent variables, but described actual conditions [29]. Types of data collection instruments used in this study was teacher structure question. This research was conducted with 12 chemistry teachers in Bandung. Data collection is expected to get a picture of the problems that exist in students' scientific literacy. The problem is focused on the use of teaching materials on chemistry subjects, one of which is the rate of reaction material and has the teacher developed teaching materials with the STSE approach. Data collection uses teacher structure question. Teacher structure question is given to the teacher. The answers from the teacher will be analyzed qualitatively so that the description of the problem of the learning process is related to the teaching materials used in chemistry subjects with material reaction rates. This research will be the basis for the development of teaching materials that are currently needed for chemistry lessons in schools.

3. Results and Discussion
Based on the results of our analysis, from figure 1 until figure 10 will be discussed. It is known that teaching materials are used in the form of textbooks, modules, worksheets, the internet and the everyday environment. Examples of teacher answers are shown in Figure 1. Furthermore, seen also from the lack of teaching materials are textbooks and student modules tend to be lazy to read because they are not interesting. While the advantages of teaching materials are power point and internet students are happier because there is animation. Examples of teacher answers are shown in Figure 2.
Viewed from the teaching materials used that need to be improved is the good teaching material made with a development model. The interaction between ideas that arise from everyday experience and ideas must be connected to each other for learning [30]. Examples of teacher answers are shown in figure 3. Then, viewed from teaching materials that can increase interest and student motivation in learning is interesting, not boring and there must be phenomena in accordance with the material being taught [31]. Examples of teacher answers are shown in figure 4.
Viewed from the teacher's knowledge of the STSE approach that the teacher knows the STSE approach is an approach that connects material to everyday life. STSE education must approach the impact of science on society and the environment. STSE is convincing in science and technology. For example the teacher's answer is shown in figure 5. Viewed from the opinions of teachers that teaching materials that can improve students' scientific literacy in the form of textbooks, e-books, modules, handouts, and job sheets. Examples of teacher answers are shown in figure 6.

Furthermore, seen from the teacher's opinion that the learning applied by the teacher now supports scientific literacy of students, the teacher said that it was very supportive only because there were so many lessons in high school. Examples of teacher answers are shown in figure 7. Furthermore, seen from the teacher's answer about teaching materials needed to support scientific literacy-based learning are library package books, handouts, and internet. Because teaching materials can contribute to modernize the learning approach in schools and can improve student learning with more processes carried out in learning. Examples of teacher answers are shown in figure 8.

Furthermore, viewed from the material of the reaction rate, the teaching materials needed today are the reaction rate practicum module, especially for vocational students in motorcycle engineering. Because the rate of reaction is a chemical material that is a component of the curriculum that can promote the intellectual development of student. Examples of teacher answers are shown in figure 9. Judging from the teacher's suggestion that the researcher wants to develop teaching materials in the form of printed books on the reaction rate material with the STSE approach to improve students' scientific literacy is to multiply the images that can visualize the concept of the reaction rate. Because teaching materials that are filled with explanations of images can help students better understand. Examples of teacher answers are shown in figure 10.

It has also been analyzed that the teacher has never developed teaching materials, and the absence of additional teaching materials used by the teacher when teaching the material for the reaction rate. The teacher has also never developed teaching materials with the 4S TMD method. The development model with the 4stmd method was developed by safflower. Development of the 4S TMD development method is a method that can be used to develop teaching materials. There are 4 steps to developing 4S TMD method teaching materials. The four important steps of this method are selection, structuring, characterization, and didactic reduction. Furthermore, viewed from the application of the STSE approach in learning, the teacher never applied the STSE approach to learning. Scientific literacy is a measuring tool for scientific knowledge, scientific skills and scientific decision making.

4. Conclusion

Based on the analysis of the teacher questionnaire, it was found that the teacher still needed teaching materials in a printed form that was filled with images that could visualize the concept of the subject matter. Teachers prefer textbooks that use more attractive colors, more detailed explanations with the display of images and more examples related to daily life so that the learning process takes place better and can improve students' scientific literacy. It would be better if teaching materials were developed with a development model and appropriate approach material reaction rate. So, teaching material in printed form is a good learning resource for students who have a visual learning style.

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