Use of the Science Technology and Society (STS) model with the help of Facebook in science learning for junior high school students

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Abstract. Research has been conducted to investigate the influence of the Science Technology Society (STS) learning model which is assisted by social media Facebook (FB) in science learning. This research was conducted in a group of junior high school students in Tondano, North Sulawesi, Indonesia. The research method is a Quasi-Experiment Posttest-Only Control Group Design. The experimental group was treated with the STS learning model assisted by FB, and the control group with lectures, discussions, question, and answer. The number of samples in the experimental group consisted of 25 students and the number of samples in the control group was 25 students. The results of the statistical analysis concluded that there was an influence of the STS learning model with the help of Facebook social media on improving student learning outcomes in science learning in junior high school students. The research data showed that the average post-test score of student learning outcomes in the experimental group was 88.5 higher than in the control group score was only 68.9. The implication of the research results is that the use of Facebook social media in the learning process will make teachers and students interact not only in the classroom. In addition, the STS learning model arouses students' interest in science learning, especially related to strengthening scientific literacy

1. Introduction
The 21st century was marked by very rapid technological progress. Today's technological developments have made people's daily lives more based on Information and Communication Technologies (ICT). Because of that the need for understanding and implementation science and technology literacy has increased [1-2]. The development of technological and information advances in such a way has demanded educational activities to use approaches in learning practices in schools, specifically in science learning. One of the science learning approaches that has remained popular until now is Science-Technology-Society (STS). Why? Because of, the use of the STS approach in science learning has indirectly applied the principles of scientific literacy. In this regard, someone called scientific literacy is one who understands the nature and procedures of science and the application of knowledge and skills in everyday life [2].

Educational experts in the 21st century put forward the opinion that what is meant by literacy is not just someone who has the ability to read and write but in a deeper sense is someone who can apply the
ability to read and write that adapts to technological developments [3]. Mastery of Science and Technology is an important key in the 21st century. One of the abilities and skills demanded in today's learners is the ability to implement social networking. In the future, social networking sites have a very important role because in addition to having significant potential in facilitating the communication of each user, but also increasingly supported by technological devices that are constantly changing and sophisticated. Such things will expand opportunities for teaching and learning outside the classroom [4]. The social media platforms that are widely used in the community are Facebook, Instagram, LinkedIn, Whatsapp, twitter, Youtube, skype, google+, blogger, and others. From a number of social media platforms that people use in communication with social networking, the Facebook platform is the most widely used [5-6]. This is because the most widely used electronic devices include mobile phones [7].

Based on the results of observations through the Field Experience Program by pre-service teachers for approximately three months in junior high schools, student completeness was obtained less than 50%, ie 30% - 35%. Lack of student learning interest in doing homework assignments, homework assignments given by the teacher are only done by an average of 41% of students. Monotonous learning model, only discussion and question and answer at each meeting and lack of utilization of communication technology in science learning. Haven't used social networking in the interaction of classmates in the learning process. Seeing the problems in science learning in such a way, a study was conducted aimed at using the STS learning model with the help of Facebook social media in the process of learning science in groups of teenagers namely junior high school students.

2. Methods
The importance of developing science and technology (or STS) such as knowledge and skills in science education, began in the early 1990s. With the scientific-literacy approach it turns out that it has significantly been able to solve socio-scientific problems. [8]. According to the OECD (2017), what is meant by scientific literacy is one's ability to understand issues and ideas related to science, as well as being able to explain phenomena scientifically, design scientific research, interpret data with scientific evidence [9]. The ability of someone who is scientific literate, is someone who has awareness and is willing to involve themselves in discourses that require scientific and technological explanations. With some views as mentioned above, what is meant by mastering science literacy is the reasoning ability of science and technology knowledge both includes understanding the process and content of science but also mastery of information, especially for the use of science and technology in the context of utilization in daily life. In addition, someone who masters science literacy, will have the behavior and attitudes like a scientist who has the characteristics of priority: truth, freedom, skepticism, originality, order, and communication. A constructivist view can be a strong theoretical basis in terms of use of ICT is useful in building new knowledge and skills as well as providing renewable insights in terms of knowledge and technology, so that in the process of interaction between teachers and students the use of ICT is a way to facilitate students and teachers interacting more creatively and meaningfully [10].

One of the social media platforms that have been used as the object of research is Facebook. Students favored the instant Facebook communications with their instructor and engagement in discussions; almost half of the students had positive thoughts about the usefulness of Facebook in education [11]. Research using Facebook in the learning process has been carried out by several researchers [12-13]. The use of Facebook has a great impact on the motivation of students to turn, effective learning and the climate in the classroom [7]. Facebook can be used as a media platform for assistance in the process of learning science, and to increase the use of e-learning and blended learning.

3. Results and Discussion
The research design used was Quasi-Experimental - Posttest-Only Control Group Design. Two groups of students from junior high school in Tondano, Indonesia each consisting of 25 students were included in this research. One experimental group by giving a treatment of the use of Science-Technology-Society (STS) in science learning with the help of Facebook. One control group by giving treatment using lectures, discussion, question, and answer in science learning. The steps of the research starting from the initial step of determining the topic of teaching materials, arranging learning plans, compiling test instruments with validity and reliability tests; the following steps are the core activities of the learning process followed by posttest; the last step is to do data analysis. The learning material chosen is the topic of additives and addictive substances, which are in accordance with the curriculum. The results of data analysis are shown in Figure 1.

![Histogram of experimental group and control group](image1)

**Figure 1. Histogram of experimental group and control group**

The comparison of the average posttest scores for the experimental group and the control group is shown in Figure 2.

![Average post-test score of the experimental group and the control group](image2)

**Figure 2. The average post-test score of the experimental group and the control group**

Based on the data shown in Figure 1 and Figure 2, the score of student learning outcomes in science learning with the STS approach assisted by Facebook is higher than the score of student learning outcomes in science learning only with lecture, question and answer models.

The average score of learning outcomes for science learning using the STS approach with Facebook is higher with the question and answer lecture learning model because students are very active from the beginning of the learning process. According to researchers’ observations, students have high learning motivation, because they use the STS approach in science learning. With the STS approach, students are very interested in exploring science learning materials related to everyday real life, social issues and studying the benefits and side effects of scientific products, examples of additive...
and addictive products. The statement mentioned above is in line with the opinion expressed by Zahara who mentioned that “Learning with STS approach motivates students and is more effective in meaningful learning than traditional methods STS approach involves students in analyzing the related issues through discussions with fellows, so that it develops students' skills via active learning processes” [14]. Furthermore, The results of previous research that increased science literacy can improve students' social skills. This may stem from scientific literacy skills, which afford students to understand the nature of science and its development; basic scientific concepts, principles, laws, and theories; to use the scientific processes in problem-solving or decision making; and interlinks amongst science, technology, society, and environment. In addition, students are able to understand and apply their knowledge to everyday life appropriately and effectively, as well as having communication skills. Therefore, equipping students with scientific literacy also trains their social skills indirectly [14].

By using the Facebook platform in the learning process, students are very active in communicating with teachers, both in class and outside the classroom, both during the day and at night. By using Facebook in the learning process arises discussion and dialogue about the tasks that students do, questions arise that require an explanation of the teacher, the teacher can monitor the progress of homework and the formation and development of science concepts in students who learn. Facebook policy states clearly that the application is to, “...create greater understanding and connection”. Social media tools are tools that allow for social interaction and easy creation of content by using examples of popular social media tools are Twitter, Facebook, Bloggers, word press and printers. Social media can be an effective tool for teaching and leaving it can help connect students and faculty builds professional networks that connect them to communities beyond the classroom [15]. Students make the results of the analysis through the experimental activities by comparing the results of observations and group discussions with the material on the Facebook group wall. According to researchers’ observations, when students make presentations and recorded by teachers, students are happy and very like, because they are recorded by the teacher in the form of videos and will be uploaded on Facebook by marking the respondents' Facebook accounts so students will prepare lab work, reports and group presentations each of them is as good as possible. Students are very active in learning while the teacher is the facilitator in the learning process. “Social networks and technology together will provide different levels of interactivity during learning process, enriching teaching methods and developing students’ skills as well as increasing the participation of students resulting in more active learning” [16]. This process has trained students to have science process skills, apply concepts, foster creativity and attitudes that appreciate technology products and are responsible for problems that will arise.

4. Conclusion
The use of the STS approach in science learning remains relevant today. Although the science learning model with the STS approach began 30 years ago, education in the 21st century that demands science education is oriented towards the formation of communities that have scientific literacy competence, the science learning model with the STS approach is still necessary and important to implement. The use of social media platforms like Facebook was very helpful in the process of learning science. Facebook as smart social networking has a positive effect on students as learners. Students are increasingly motivated to learn, increasingly eager to pursue the field of science, especially related to everyday life. Because of that indirectly it has applied the principles of scientific literacy.

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