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The Influence of Quantum Teaching Learning Model Assisted Digital Media (Edmodo) Toward Science Literature and Self-Efficiency of Highschool Students

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Abstract: This study aims to determine the effect of the Quantum Teaching learning model assisted by digital media (edmodo) on scientific literacy and self-efficacy. The type of research conducted is experimental research using a pretest-posttest control group design. The population in this study included all students of class X SMA Negeri 1 Muara Batu. The sampling technique used is purposive sampling. The sample in this study is class X MIPA 1 as the experimental class and X MIPA 2 as the control class. The experimental class was treated using the Quantum Teaching learning model while the control class was treated using the conventional learning model. The results of student literacy were obtained through a scientific literacy test instrument that had been validated and student self-efficacy was obtained through the provision of a valid student self-efficacy assessment questionnaire. Hypothesis testing in this study using independent sample t-test. The results of the t-test results of scientific literacy have a sig value of 0.038 <0.05 and the t-test results for students' self-efficacy have a sig value of 0.045 <0.05. So that H0 is rejected and Ha is accepted, in other words this means that there is a significant influence of the Quantum teaching learning model assisted by digital media (Edmodo) on the results of scientific literacy and self-efficacy of high school students.

Keywords: Quantum Teaching Model; Digital Media *(edmodo)*; Scientific Literacy; Self-efficacy

Introduction

Science is growing very rapidly in the 21st century, one of which is chemistry. Chemistry has the characteristics of presenting various phenomena in life. Characteristics of chemistry can be seen from the sub-macroscopic, microscopic and symbolic aspects so that it requires expertise and reasoning. These three aspects are interrelated to improve competence so that students are able to master and explore phenomena that occur in nature (Hasbiah et al., 2022; Kurniyati, 2016). The development of chemistry in learning is shown in scientific products, scientific procedures and scientific behavior possessed by students and affects the learning process. In the educational process, the result of changing the learning process that is evaluated through a test is called learning achievement (Muliaman et al., 2018; Muliaman & Ginting, 2022).

According to (Rejeki & Ariani., 2013) Education contributes to improving the quality of a nation's human resources. Innovation in education needs to be tried to improve the quality of learning and the quality of human resources. Educational innovation must be adapted to the growth of science and technology. One of the determining aspects in improving the quality of education is an increase in learning activities, especially in the classroom. So that innovation in learning activities is needed, learning which was originally teacher center becomes student centered learning that involves student activity so that the goals of education can be achieved according to the 2013 curriculum (Farikha et al., 2015;

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Muliaman & Mellyzar, 2020). practice new curricula, methods, and models and procedures in learning.

Based on the results of unstructured interviews that have been conducted with chemistry subject teachers who teach at SMA Negeri 1 Muara Batu. Chemistry learning that takes place at the school is still teacher-centered (Ginting et al., 2020; Gultom, 2018), where teachers dominate learning using the lecture method and Direct Instruction learning model which causes students to find it difficult to associate the learning they get with phenomena that exist around them, are less active in asking questions and giving opinions in the learning process. In addition, the learning process feels monotonous which results in students only taking notes, listening and doing practice questions from the teacher which causes students to become bored in learning (Restami & Suma, 2013; Suhada et al., 2019). So that students do not develop their thinking skills on the material that has been studied. This causes there are still students whose learning outcomes are below the KKM, which is 70 and students' attitudes are reduced.

According to (Sudirman & Maru, 2016) learning outcomes are also interpreted as results achieved after the learning and learning process occurs, which results in changes in behavior and form rather than learning outcomes in the form of numbers or values obtained from learning outcomes tests. Learning outcomes can also be called training or outcomes, which are skills received by students through learning or training that is tried or transferred by a teacher to students who want to create skills, knowledge, and values that students can implement in their lives, whether applied in society. , in the family or the world of work (Taneo, D. J., & Nomleni, 2022).

According to (Suharsimi, 2013), classifying learning abilities into 3 major domains or domains, namely: 1). Cognitive domain, is an intellectual ability including: knowledge, understanding, application, analysis, synthesis and evaluation. 2) Affective domain, with regard to behavior and interests include: acceptance, answer or response, evaluation, organization, and internalization. 3) Psychomotor domain, includes physical skills (motor) and acting skills, which consist of reflex movements, basic movement skills, perceptual skills, harmony or accuracy, complex skill movements, and expressive and interpretive movements. So, it can be concluded that learning outcomes are values obtained through tests after the learning and learning process takes place and produces better behavior changes and more students' abilities, both from cognitive, affective and psychomotor aspects.

One of the things that underlies this cognitive learning outcome in the field of science is scientific literacy. One of the international programs that can be used as a guide to see the picture of the quality of education in a country is The Program for International Student Assessment (PISA). The results of the assessment of the scientific literacy of international students are still apprehensive (Latip & Permanasari, 2016). The report from the Organization for Economic Co-operation and Development (OECD, 2015), shows that the scientific literacy rating of Indonesian students in 2013 was 382. This figure is far from the average. The average science score of all participants is 501 and Indonesia is ranked 64th out of 65 participating countries. PISA groups these competency dimensions into 3 main aspects, namely explaining phenomena scientifically (explain phenomena scientifically), evaluating and making scientific investigations (evaluate and design scientific inquiry), and interpreting data and showing facts scientifically (interpret data and evidence scientifically).

As for affective learning outcomes, one of them is self-efficacy. Self-efficacy is an individual's belief about his abilities. “Self-efficacy is the belief of the extent of individual estimates his ability in executing a task or action required to achieve.” Bandura (Qudsyi & Putri, 2016) Which means efficacy is the belief of the extent to which individuals estimate their ability to carry out tasks or actions required to achieve them. Self-efficacy is "students beliefs about their capabilities to complete a task successfully."(Al-baddareen et al., 2015), Self-efficacy determines how people feel, think, motivate themselves and behave (Baanu & Oyelekan, 2016). Self-efficacy in this study is measured by three dimensions of Bandura (Zimmerman, 2000), namely (1) level, (2) generality, and (3) strength.

Referring to the problem above, it can be said that the learning system has not run as expected, for that we need a learning model that does not require students to only memorize concepts, but urges students to create their own learning concepts through direct experience. The learning process to improve learning outcomes can be tried in the form of activities that focus students on working and experiencing the whole learning process in groups. One model that can be used is quantum teaching. According to (Shoimin, 2014)Quantum teaching learning is a lively learning change, with all its nuances. The Quantum teaching model is defined as an orchestration of various interactions that already exist in the learning moment. These interactions include both elements of effective learning that affect overall student success. (Diantoro et al., 2020) said that the Quantum Teaching model involves students making learning more comfortable and fun. In addition, this learning model will be assisted by learning media. (Amalia, S. R. et al., 2020) stated that the presence of learning media in learning activities will help teachers convey learning messages and help students understand learning concepts. The digital media that can be used is Edmodo. Edmodo is an E-Learning-based platform that was developed and used to assist teachers in creating

learning networks in a classroom. The edmodo application integrates technological advances with learning materials

Therefore, the researcher made this research with the title "the influence of the quantum teaching learning model assisted by digital media (edomodo) on scientific literacy and high school students' self-efficacy". The formulations in this study are: 1) whether there is an influence of the digital media-assisted quantum teaching learning model (edmodo) on the scientific literacy of high school students, 2) whether there is an influence of the digital media-assisted quantum teaching learning model (edmodo) on self-efficacy of high school students.

Method

The type of research conducted is experimental research. In this research design, the approach used is a quantitative approach because this study uses numerical data that can be processed using statistical methods. This study uses a design that is pretest-posttest control group design (Sugiyono, 2009) The study was conducted in two classes, namely the experimental class which applied the quantum teaching learning model and the control class which applied the conventional learning model, namely Direct Instruction. This research was conducted by giving pretest and posttest to both classes. The pretest was given to determine the students' initial abilities before being given a different learning model and the posttest was given to determine student learning outcomes after being given a different learning model, namely the conventional learning model and the quantum teaching learning model. The research design carried out is in accordance with Table 1.

Table 1. Schematic of Research Design pretest-posttest control group design.

Class	Pretest	Treatment	Posttest
Experiment	Yes	Quantum Teaching learning model	Yes
Control	Yes	Direct Instruction learning model	Yes

The variables in this study are the independent variable and the dependent variable. The independent variable (independent variable) is the quantum teaching learning model on science material, while the dependent variable is the student's cognitive learning outcomes and student attitudes on the reaction rate material. The population in this study were all students of class X MIPA at SMA Negeri 1 Muara Batu, while the samples in this study were students of class XI MIPA-1 as the experimental class and class X MIPA-2 as the control class, each totaling 35. The sampling technique used was The method used in this study is purposive sampling, which is a sampling technique of data sources with certain considerations, for example, the person is considered to know best about what we expect (Sugiyono, 2016: 85). The data collection technique in this research is by using research instruments in the form of: Tests are used to determine students' cognitive learning outcomes after learning using the quantum teaching learning model and questionnaires are used to measure self-efficacy. Before the test is given to students, the instrument is validated by an expert validator. The data analysis technique used in this study is the normality test and homogeneity test as a prerequisite test before testing the hypothesis using the Independent Sample T-Test test on SPSS Version-25 software.

Result and Discussion

This study aims to determine the effect of the quantum teaching learning model on the results of scientific literacy and student self-efficacy on the material for the reaction rate of class X SMA Negeri 1 Muara Batu. The data obtained in this study were data on learning outcomes in the cognitive aspect obtained from the pretest and posttest and the results of scientific literacy in the affective aspect obtained from students' self-efficacy. Student learning outcomes were then tested for normality, homogeneity test and hypothesis testing. The list of calculations for the average value of scientific literacy results and the results of self-efficacy in the experimental class and control class can be diagrammed as follows:

Table 2. The average value of scientific literacy results and self-efficacy results

Scores	Experiment	Control
science literacy pretest scores	33.59	31.28
science literacy posttest scores	75.66	70.51
self efficacy posttest scores	78.43	73.04

Based on Table 2 above, the learning outcomes in terms of the cognitive aspects of students' scientific literacy, there is an average pretest score of 33.59 which is categorized as lacking and an average posttest score of 75.64 which is categorized as good and an average student self-efficacy score of 78 .43 which is categorized as good in the experimental class and learning outcomes in terms of the cognitive aspects of students' scientific literacy, there is an average pretest value of 31.28 which is categorized as less and an average posttest value of 70.51 which is categorized as good and the average efficacy value students' self is 73.04 which is categorized as good in the control class.

Table 3. Normality Test Results of Science Literacy Results and Students' Self-Efficacy Tests of Normality

Class	Scientific Literacy		Self efficacy	
	Shapiro-Wilk		Shapiro-Wilk	
	Statistic	Sig.	Statistic	Sig.
Experiment	0.936	0.33	0.918	0.182
Control	0.914	0.158	0.918	0.179

Based on the results of the calculation of the normality test from the results of students' posttest scores using SPSS Version 25, it was obtained that the probability value (sig) in the experimental class was 0.330 and in the control class was 0.158, it can be concluded that the experimental class produced a probability (sig) 0.330> 0.05 so that the data normally distributed and the control class produces a probability (sig) of 0.158 > 0.05 so that the data is normally distributed. Therefore, it was found that all groups, namely the experimental class and the control class, were normally distributed and based on the results of the normality test calculation from the results of the student attitude questionnaire scores using SPSS Version 25, it was found that the value (sig) in the experimental class was 0.182 and in the control class was 0.179, then it can be concluded that the experimental class produces a probability (sig) of 0.182> 0.05 so that the data is normally distributed and the control class produces a probability (sig) of 0.179> 0.05 so that the data is normally distributed. Then it can be obtained that all groups, namely the experimental class and the control class, are normally distributed.

Table 4. Test Results of Homogeneity of Science Literacy Results and Students' Self-Efficacy Test of Homogeneity of Variance

Experiment and Control Class	Scientific Literacy		Self efficacy	
	Levene Statistic	Sig.	Levene Statistic	Sig.
Based on Mean	2.577	0.12	2.621	0.117

The results of the homogeneity test calculation from the results of students' posttest scores using SPSS Version 25 obtained that the value (sig) Based on Mean 0.120 > 0.05, it can be concluded that the two classes, namely the experimental class and the control class have the same variance or are homogeneous and based on The results of the homogeneity test calculation from the results of the student attitude questionnaire scores using SPSS Version 25 obtained that the value (sig) Based on Mean 0.117 > 0.05, it can be concluded that the two classes, namely the experimental class and the control class, have the same variance or are homogeneous.

Table 5. Results of the Scientific Literacy t Test Independent Samples Test

Scientific Literacy	t-test for Equality of Means		
	t	df	Sig. (2-tailed)
Equal variances assumed	2.178	28	0.038
Equal variances not assumed	2.178	25.618	0.039

Based on table 5 the results of the t-test of students' scientific literacy results, there is a value of sig = 0.038. This means that the value of sig 0.038 <0.05, so that H0 is rejected and Ha is accepted, in other words this means that there is a significant influence of the quantum teaching learning model on the results of high school students' scientific literacy. The results of this study are in line with the results of research conducted by (Ithri & Suprayitno., 2014)which states that the quantum teaching learning model has a positive and significant influence on student learning outcomes in cognitive aspects. This is because learning with the quantum teaching learning model emphasizes student activities in the learning process by using a series of scientific methods to build concepts during the learning process. The quantum teaching learning model places students as learning subjects and teachers as facilitators, mentors and motivators so that students are self-involved in the process of discovering concepts and constructing their knowledge.

Table 6. Results of t-test results of students' self-efficacy

Independent Samples Test			
Self efficacy	t-test for Equality of Means		
	t	Df	Sig. (2-tailed)
Equal variances assumed	2.102	28	0.045
Equal variances not assumed	2.102	24.735	0.046

Based on table 6 the results of the t-test results of students' self-efficacy there is a value of sig = 0.045. This means that the value of sig 0.045 <0.05, so H_0 is rejected and Ha is accepted, in other words this means that there is a significant effect of the quantum teaching learning model on the self-efficacy of high school students. The results of this study are in line with the results of research conducted by(Saraswati, 2022) which showed that students' scientific attitudes were significantly different between students with the quantum teaching model and students with expository strategies. So that the quantum teaching model affects the self-efficacy of students who have an attitude dimension that is in accordance with the indicators of self-efficacy. This is because the three stages of the quantum teaching learning model can stimulate them to experiment in order to find knowledge that causes their confidence to

develop. Thus, students will get a learning experience that provides opportunities for students to try and try to find answers to various problems presented by the teacher.

Conclusion

Based on the results of research and discussion, it can be concluded that: 1) the quantum teaching learning model has an influence on the scientific literacy of high school students, 2) the quantum teaching learning model has an influence on the high school students' self-efficacy. It is hoped that educators, especially teachers in the field of chemistry, can apply varied learning models according to the type of material to be taught so that students are always motivated and active in learning.

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