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Web Media in Combined Guided Inquiry Learning Lesson Study on Creative Thinking and Student Learning Outcomes

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Abstract
This research aims to determine the creative thinking skills of students who are taught using web media, guided inquiry learning combined with lesson study, which is higher than without using web media. And knowing that the learning outcomes of students taught in guided inquiry learning combined with lesson study using web media are higher than without using web media. The research population was students of class XI Science High School. The sampling technique was simple random sampling consisting of two classes, namely experimental and control with a total sample size of 76 students. This research instrument is a creative thinking test and student learning outcomes. Data analysis techniques are carried out by calculating the level of concept understanding, testing data homogeneity, normality testing and hypothesis testing. The results of the research show that the learning outcomes and creative thinking of students taught in combination lesson study inquiry learning using web media with an average gain of 0.71 and an average of 75.46 compared to without using web media with an average of 0.60 and 55. .20 with significance (0.00 < 0.05).

1. Introduction

Education is an important thing in human life, through education, humans can escape from backwardness. In the world of education, some things need to be prepared so that people can maintain and improve the quality of life and improve human development holistically (Sarniati,

Sudarman, and Subagio 2021). One of the utilization of technology in the field of education that is currently developing is web-based learning which is part of e-learning (Rahman et al., 2019).

Web-based learning offers several advantages, namely speed and unlimited time and space to access information. Learning strategies using *e-learning* are part of the effort to utilize technological advances to improve the quality of learning (Sudarman 2014). Rapid technological advances influence changes in the world of education and learning, learning technology adopts the latest findings in the learning process. *E-learning* provides a very effective experience in learning. By using web-based learning media students can continue to learn anywhere, by continuing to learn students can improve their learning outcomes.

Information and Communication Technology (ICT) is increasingly important in learning innovation. Today World Wide Web *(www)* technology is the only alternative among the various media available to help people learn (Boisvert, 2000). Web learning is a computer-supported learning method. Some researchers suggest that computer-based learning that has an attractive appearance is more effective in facilitating understanding and mastery of contexts and processes in learners.

In addition to the utilization of learning media, another thing that is no less important in the learning process is the selection of learning strategies. Learning strategy is an art and science to bring learning in such a way that learning objectives can be achieved efficiently and effectively (Lewis, 2002). Learning in general will be more effective when organized through learning models related to the process of delivering information. The essence of better thinking is the ability to solve problems which is fundamental to problem-solving is the ability to learn in a creative thinking process situation.

However, the reality in the field shows that students' creative thinking skills are not optimal, the low ability to think creatively is suspected because so far the teacher has not tried to explore students' knowledge and understanding of creative thinking. During this time the teacher only carries out learning procedurally, only provides formulas, and then does exercise questions without providing opportunities for students to think creatively as a result students do not find the meaning of what they learn (Azhari, 2013). Thus, students should be taught how to learn including what to teach, types and conditions of learning, and obtaining new views, one of which is included in this processing model is a guided inquiry learning strategy.

With guided inquiry learning strategy combined with *lesson study*, it can help teachers' profession or competence to build a learning community. *Lesson study* is a comprehensive approach

to proportional learning and supports teachers to become lifelong educators to develop and improve the quality of learning in the classroom. *lesson study* is not a learning method or strategy but *lesson study* activities can apply various learning methods or strategies that are by the situation, conditions, and problems faced by teachers.

Chemistry learning in general is only limited to the use of teaching materials in the form of textbooks and LKS so students are less able to understand microscopic concepts. In addition, teachers also rarely create a conducive atmosphere in the learning process and have not even implemented learning steps for creative thinking, so students are not motivated to learn. Therefore, efforts to improve the quality of chemistry learning are currently being carried out, including various kinds of learning strategies and media.

One of the central issues in chemistry education in the learning process is for students to solve problems conceptually rather than just applying mathematical equations. Research in chemistry education has shown that students tend to learn and solve calculation problems but often do not understand the deeper conceptual aspects of chemistry and the reasoning needed to be more creative and flexible in problem-solving. While students are often successful at problems that are very similar to those described in textbooks or demonstrated in classrooms, learners tend to problem solve problems that can be solved with similar techniques.

Difficult chemistry materials are increasingly difficult due to limited learning time at school and the lack of interesting methods or strategies and media used in learning taught by teachers, making students have to follow additional learning outside of school such as tutoring. Tutoring institutions (Bimbel) today are so popular among students and parents and can be found in almost every corner of big cities. Now tutoring in big cities and for students in their favorite high schools is no longer just a trend, following tutoring has now become an obligation for students, starting from elementary, junior high, and high school levels. Especially high school students who intend to continue to favorite state universities such as UI, ITB, UGM, and other leading state universities. Many students admit that they take extra courses because of time constraints, the limited learning material provided by the teacher has not been able to become an asset to participate in the Joint Selection for Entering State Universities (SBMPTN), also because of boring learning methods and lack of facilities and infrastructure to support learning (Sibuarian, 2014).

The results of previous research using the web with the title Effect of *Inquiry Wheel* Learning Model and Web-Based Media on Student Learning Outcomes on Thermochemical Subjects. The results of this study obtained information that one solution to overcome the cause of the difficulty of students mastering chemistry material is by means of teachers providing subject matter in a variety of

ways using media or interesting learning strategies. The results of his research concluded that the learning outcomes of students taught using *inquiry wheel* learning and web-based media were higher than the learning outcomes of students using accessory learning without media (Sipayung, 2011).

The purpose of this study is to find out: whether the learning outcomes of students taught in guided inquiry learning combined with *lesson study* using web media are higher than without using web media; and know the creative thinking of students taught in guided inquiry learning combined with lesson study using web media is higher than without using web media.

E-learning comes from the letters 'e' (electronic) and learning. Thus e-learning is learning that uses electronic services. In general, the definition of e-learning is the delivery of learning materials through one electronic media such as internet, internet/extranet, satellite broadcast, audio/video, tape, interactive TV, CD-ROOM, and Computer Base Training (CBT) in a more flexible manner to support and improve learning, teaching, and assessment. More specifically e-learning is defined as the utilization of Internet technology to distribute learning materials so that students can access them from anywhere.

Various definitions of E-Learning may differ from one another, but one thing that is the same about E-Learning or electronic learning is that it is learning through electronic assistance services. E-Learning is learning that represents a whole category of technology-based learning. While web-based learning is a part of *E-Learning.* However, along with the development of technology and the shift of content and adaptivity, nowadays the classic definition of *E-Learning* has changed into a more contemporary definition, which is learning management through the internet or web media that includes aspects of material, evaluation, interaction, communication, and cooperation.

There are 3 (three) functions of electronic learning *(e-learning*) with electronic media) on learning activities, namely: 1) *Supplement* (Additional) which functions as a supplement (additional), if students have the freedom to choose, whether to utilize electronic learning materials or not. In this case, there is no obligation for learners to access electronic learning materials. Even if it is optional, learners who utilize it will certainly have additional knowledge or insight. 2) Complement, which functions as a *complement* if electronic learning materials are programmed to complement the learning materials received by students. As a complement means that electronic learning materials are programmed to be *reinforment* (enrichment) or remedial materials for students in following conventional learning activities. Electronic learning materials are said to be enrichment if students who can quickly master/understand the subject matter delivered by instructors face-to-face *(fast learners)* are allowed to access electronic learning materials that are specifically developed for them. The goal is to further solidify the level of mastery of learners of the subject matter presented by the

teacher/instructor. 3) *Substitution*, namely several alternative models of learning activities for learners. The goal is that learners can flexibly manage lecture activities according to the time and other daily activities of the learners.

Guided Inquiry Strategy

Guided inquiry is a learning strategy that trains students' thinking skills. Students' thinking skills are trained through stages in the learning cycle consisting of exploration, concept formation, and application (Moog, 1989). Guided inquiry helps students' mastery and understanding of concepts because students are involved in the learning process. The learning process in guided inquiry strategy refers to thinking skills in processing information received to form concepts rather than just memorizing and learning formulas. Learning that pays attention to process skills will make learning meaningful (Wayudiningsih, 2013).

Inquiry learning is one of the innovative models used in science learning. In the scope of learning and learning, the term inquiry implies all activities carried out by students where they build knowledge and understanding of scientific ideas as scientists do in discovering and building understanding (Istrani, 2011). Inquiry is a way of delivering lessons by examining something that is searching, analyzing, and argumentative (scientific) by using certain steps toward a conclusion.

The first step is to formulate a problem, the teacher guides students to determine a problem related to the lesson presented, and then think of the answer themselves. The second step is to propose a hypothesis, the teacher guides students to find a temporary answer to the problem found. The third step is collecting data, students conduct simple experiments. The fourth step is testing the data based on the data found. Students test the experimental results with related facts and theories. The fifth step is making conclusions, students present the results of their discussions in front of the class and make conclusions (Ambasari, 2012).

Lesson Study

Lesson study is a model of professional development of educators through collaborative and sustainable learning assessment based on the principles of collegiality and mutual learning to build a learning community (Sumar, 2006). *Lesson study* is a comprehensive approach towards proportional learning and supporting teachers to become lifelong learners to develop and improve the quality of learning in the classroom. *lesson study* is not a learning method or strategy but *lesson study* activities can apply various learning methods or strategies that follow the situation, conditions, and problems faced by teachers who cannot be separated from collaboration.

The collaborative learning process includes: (1) how teachers communicate with students about the information to be taught and what the assessment criteria are, (2) how students communicate with teachers and other students, (3) whether communication in the classroom is one-way, two-way, or multi-directional, (4) whether communication is in the form of writing, speech, or touch and props. Effective ways to implement it according to Istarani (2012) are: (1) grouping using ability level references must be done carefully; (2) the number of group members must be kept small, in one group of 3 to 4 members and a maximum of 5 members (students); and (3) collaboration must be applied consistently and systematically but should not be overused.

Creative Thinking Skills

Thinking is generally defined as a mental process that can produce knowledge. Thinking skills are needed by everyone to succeed in life. John Dewey in 1916, stated that schools should teach students to think. Thinking is a mental activity to formulate or solve problems, make decisions, attempt to understand something, find answers to problems, and find the meaning of something. All parents and teachers agree that students in schools should be taught how to think, especially about higher-order thinking, because these skills will be very useful in all their lives.

Thinking skills are always developing and can be learned. Thinking skills can be divided into basic thinking skills and complex thinking skills. The basic thinking process is a description of the rational process which contains a set of mental processes from simple to complex. The thinking activities contained in rational thinking are memorizing, imagining, classifying, generalizing, comparing, evaluating, analyzing, synthesizing, deducing, and concluding. In this case, the basic thinking processes are finding relationships, connecting cause and effect, transforming, classifying, and qualifying. Complex thinking processes are known as higher-order thinking processes. Complex thinking processes can be divided into critical thinking and creative thinking.

Creative thinking can be defined as thinking that can connect or see things from a new perspective. Creativity is also a spontaneous ability, that occurs because of internal direction, and its existence cannot be predicted. Creative ideas usually arise due to interaction with the environment or extra stimulus.

Creative thinking is a process that involves elements of originality, fluency, flexibility, and elaboration. It is further said that creative thinking is a process of being sensitive or aware of problems, deficiencies, and gaps in knowledge for which there is no learned solution, bringing in existing information from memory stores or external sources, defining the difficulty, or identifying missing elements, searching for solutions, conjecturing, creating alternatives to solve the problem, testing and

retesting the alternatives, refining them and finally communicating the results. To find out the level of creativity of a person. It is necessary to assess the creative thinking ability of the person. The assessment must include four criteria of creative thinking, namely fluency, flexibility, originality, and detail in expressing ideas.

The characteristics of creative thinking skills include: 1) Fluent thinking skills; (a) generating many relevant ideas/answers, (b) generating learning motivation, and (c) smooth flow of thought. 2) Flexible thinking skills; (a) produce uniform ideas, (b) be able to change methods or approaches, (c) different directions of thought; 3) Original thinking skills; (a) provide unusual answers, (b) provide answers that are different from others, (c) provide answers that are rarely given to many people; 4) Detailed thinking skills; (a) develop, add, enrich an idea, (b) specify details, (c) expand an idea (Azhari, 2013).

2. Methodology

This type of research is a quasi-experiment (pseudo-experiment) with research instruments used to obtain creative thinking data in the form of a multiple-choice test of 20 test items and to obtain learning outcomes data given at the beginning and the end of the activity at the form of multiple choice with 25 test items. Meanwhile, to see student responses to web media obtained from web media questionnaires and lesson study learning activity evaluation assessments obtained from learning activity observation questionnaires.

Creative Thinking Ability: measuring creative thinking ability by giving the task of making some questions or statements based on information on the questions given. A test as a data collection instrument is a series of questions or exercises used to measure knowledge skills, intelligence, abilities, or talents possessed by individuals or groups. The form of the creative thinking ability test instrument is in the form of multiple-choice questions consisting of 20 multiple-choice questions to fulfill the test indicators, namely: 1) build on knowledge that students already have; 2) arouse curiosity; 3) view information from different points of view; 4) predict from the top information.

Learning Outcomes: The test is given in the form of *multiple* choice consisting of 25 questions. The correct answer is given a value of 4 and the wrong answer is given a value of 0. Before the test is carried out, the test is first validated in the form of a content validator (expert). *Content* validator *(content validity)* is called curriculum validity which means that a measuring instrument is considered valid if it is following the content of the curriculum to be measured. Content validity is determined by seeing whether the questions used have shown a sample of the attributes being measured. According to Guion (1977), content validity is highly dependent on two things, namely the test itself and the process

that influences in responding to the test. One way to obtain content validity is to look at the questions that make up the test. If all the questions appear to measure what the test is supposed to be used for, there is no doubt that content validity has been met.

3. Result

The data described in this study include data on learning outcomes and creative thinking of students in chemistry subjects in class XI SMA Negeri 2 and SMA Negeri 3 Medan. Student learning outcomes in the experimental class of both schools are the learning outcomes of students taught with inquiry learning combined with lesson study using web media and in the control class of students taught without using web media for each school. And creative thinking of students treated with inquiry learning combined with lesson study using web media (experimental) and those treated without web media (control).

Creative thinking data is obtained from the results of quiz questions in the form of multiple-choice questions (Multichoice), by grouping in two groups, namely high-thinking groups and low-thinking groups. Meanwhile, to find out the student's response to the use of the web, an observation was given in the form of a questionnaire to students measured in five aspects. Based on the data obtained in the study and after tabulation, the description of the research data is as follows:

Use of Web Media in Guided Inquiry Learning Combined with Lesson Study

a. Creative Thinking Ability

Guided inquiry learning is a learning process that maximally involves all students' abilities to search and investigate systematically, when students are required to investigate a problem students can access the web media that has been designed.

On the web users are divided into 3, namely: a) *Guest* is a user who can only access the home page and can only see using the web. b) *Member* is a user who has registered on the web. *Members* in the learning evaluation system application (quiz questions) using web media act as students. c) *Admin* is a user who has full access to the web. *Admins* can manage web displays and create online evaluations. The use of the web on members (students) is accessed when conducting evaluations with a time limit of 12 hours per meeting.

The results of student responses to the use of web media are with the comparison of aspects as follows:

Table 3.1 Results of student responses to web media

Aspects of Student Response to *Web* Media		
No	**Aspects**	**Percentage (%)**

1	Pleasure	1,1
2	Attention	1,61
3	Sense of Interest	2,09
4	Curiosity	2,13
5	Enthusiasm/willingness	3,7

From the table above, it can be seen that students' responses to web media with a higher ratio are successively in the aspects of enthusiasm/willingness 3.7%, curiosity (2.13%), interest (2.09%), attention (1.61%) and the aspect of curiosity 1.1%.

Table 3.2 Description of independent sample test hypothesis testing data

Levene's Test for Equality of Variances			**t-test for Equality of Means**						
	F	**Sig.**	**T**	**Df**	**Sig.(2-tailed)**	**Mean differen sial**	**Std. error diffrensial**	**95% Confidence Interval of the Difference**	
								Lower	**Upper**
Berpikir Kreatif	.271	.603	11.046	150	.000	20.263	1.834	16.639	23.88

From the test results obtained Sig. (1-tailed) < α (0.000 < 0.05), it is concluded that the hypothesis of creative thinking in both schools is accepted, namely Ha is accepted. This means that the creative thinking of students taught in guided inquiry learning combined with lesson study using web media is higher than without web media. When viewed from the creative thinking of students taught in guided inquiry learning combined with lesson study using web media is higher than without web media based on the following table:

Table 3.3 Description of Creative Thinking

	N	**Mean**	**Stand. Deviation**	**Stand.Eror Mean**
Experiment	76	75,46	10,557	1,211
Control	76	55,20	12,012	1.378

Table 3.3 shows that the average value of creative thinking of students who are taught in guided inquiry learning combined with lesson study using web media is 75.46 higher than without web media of 55.20. Creative thinking ability in this study is an independent variable when it is known that students' creative thinking affects learning outcomes by grouping into 2 categories, namely high creative thinking and low creative thinking categories.

b. Learning Outcomes

Hypothesis testing using SPSS 21 with an independent T-test is shown in the following table:

Table 3.4 Description of hypothesis testing data using independent sample test

Levene's Test for Equality of Variances			t-test for Equality of Means						
	F	Sig.	T	df	Sig.(2-tailed)	Mean differensial	Std. error diffrensial	95% Confidence Interval of the Difference	
								Lower	Upper
Pretes	0,28	.866	3.912	150	.000	4.684	1.1998	2.318	7.050
Postes	6.04	.015	6.380	150	.000	5.053	.792	3.488	6.617

Based on data testing using SPSS 21 *for Windows* is if Sig. (1-tailed) < α then Ha is accepted, but if Sig. (1-tailed) > α then Ha is rejected or H0 is accepted. From the test results obtained Sig. (1-tailed) < α (0.000 < 0.05) with the T-test, it is concluded that Ha in both schools is accepted. That is, the learning outcomes of students taught in guided inquiry learning combined with *lesson study* using web media are higher than without web media.

When viewed from the learning outcomes obtained in the experimental class with the control class, the learning outcomes taught in guided inquiry learning combined with *lesson study* using web media are higher than without web media. Based on this, the description of the data on student gain results in the following table:

Table 3.5 Description of the average gain results of experimental and control classes

	N	Mean	Std. Deviasi
Gain Eksperimen	76	0,71	0.9
Gain Kontrol	76	0,60	0,9

Table 3.5 shows that the average value of the gain in student learning outcomes taught with guided inquiry learning combined with *lesson study* using web media is 0.71 higher than the average value of the gain taught without using web media of 0.60 with the results of data testing using SPSS 21 *For Windows* with Independent Samples Test obtained a significance of 0.000 <0.05, namely student learning outcomes taught in guided inquiry learning combined with *lesson study* using web media is higher than without web media.

4. Discussion

The results showed that in general the use of web media in guided inquiry learning combined with *lesson study* on reaction rate material had an influence on creative thinking and student learning outcomes, where student responses to the use of web media were obtained in the aspects of enthusiasm

/ willingness of 3.7%, curiosity (2.13%), interest (2.09%), attention (1.61%) and aspects of curiosity 1.1%. To implement guided inquiry learning combined with lesson study using web media, the results showed that 86.7% was implemented in the experimental class and 71.9% in the control class.

The results showed that student learning outcomes in guided inquiry learning combined with lesson study using web media had an average gain of 0.71 higher than student learning outcomes without using web media with an average gain of 0.60. This is because in the implementation of guided inquiry learning students look active in finding and digging up information on the problems given. During the learning process with guided inquiry learning, students communicate with their groupmates or ask the teacher's students and open web links to facilitate them in finding problem-solving. This is by the results of research by Pricila Cindiana, et al (2019) by using internet media based on inquiry learning, student learning motivation increases more than before using internet media. In addition, the results of Nurlatifah's research (2023) provide an effect on increasing students' understanding by using guided inquiry-oriented Google sites developed as learning media.

Other supporters of this research from the results of Nevi Dila Restu Anggraeni's research (2023) show that website-based learning media can provide very effective learning to students. In addition, according to the research of Ribut et al (2022) by utilizing digital learning media through lesson study, teachers can learn from each other digital applications freely without fear and reluctance. Through lesson study, teachers are also accustomed to being open, learning from each other to provide input from other teachers.

The role of activities to improve creative thinking and learning outcomes is a form of student interest in learning. The ability of activity arises due to the interaction of students with the learning atmosphere they experience, namely guided inquiry learning combined with lesson study using web media during the learning process. During learning, students are directed to listen, ask questions, and provide answers, as well as search for information so that students are more active by the syntax of guided inquiry learning combined with lesson study using web media. Guided inquiry learning model combined with lesson study is a combination of inquiry learning with lesson study.

4. Conclusion

From the results of the study, it can be concluded that the creative thinking of students taught in guided inquiry learning combined with lesson study using web media with an average value of 75.46 is higher than students taught without web media with an average value of 55.20.

The learning outcomes of students taught in guided inquiry learning combined with lesson study using web media with an average gain of 0.71 are higher than students taught without web media with an average gain of 0.60.

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