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Implementation of Guided Discovery Learning Model with SETS Approach Assisted by Chemistry E-Module to Improve Creative Thinking Skills of Students

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Abstract: Creative thinking skills can train and develop thinking processes in finding new ideas and ideas to solve chemical problems and problems through discovery, exploration, experimentation, showing and demonstrating similarities, differences, and consistency. Therefore, it is necessary to update what has been learned, such as choosing the right strategy. This study aims to demonstrate the effect of implementing a guided discovery learning model using a SETS approach supported by the chemical Young's modulus on the creative thinking skills of students in the SMAN 1 Padang XI class. The method used was a quasi-experimental study with a randomized control group posttest-only design. The population of this study is all SMAN 1 Padang Class XI students enrolled in the 2021/2022 academic year, which includes 7 classes. A study population is grouped using random sampling techniques. The non-testing tools used were the Student Profile Assessment Form and the Creativity Assessment Criteria. The data analysis technique in this study was quantitative data analysis, testing hypotheses by using two unpaired samples in the mean similarity test analysis $t_{count} > t_{table}$. The result of the hypothesis test indicates that the research hypothesis is accepted. This means that the implementation of the Guided Discovery Learning Model using the SETS approach supported by the Electrochemistry module has had a significant impact on the creative thinking skills of students in Class XI at SMA 1 Negeri Padang.

Keywords: Model Guided Discovery Learning; SETS Approach; E-Module Chemistry; Creative Thinking

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Introduction

Problem-solving skills, critical thinking, and creative thinking are educational goals in learning and are needed by students to face the globalization of ERI 4.0. Creativity is the result of training in creative thinking skills. Creative thinking skills can train and develop thinking processes to come up with new ideas and ideas to solve problems. The important goal of learning chemistry is to train thinking and reasoning in solving problems, for example drawing conclusions by finding, exploring, experimenting, showing, and displaying similarities, differences, and consistency (Nursa'adah & Rosa, 2016; Sari et al, 2021; Yulianci et al, 2021).

Concepts in chemistry are not only taught in abstract form, but students must also work independently in small groups, sharing ideas about any

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given material concept so that students can better understand them (Alabi & Nureni, 2016). So that it is necessary to renew learning from various things, such as choosing the right strategy and guidance from the teacher, namely by implementing the guided discovery learning model or abbreviated as the GDL model.

The GDL model has a learning syntax that allows students to think creatively which is part of higher-order thinking skills (HOTS). This is supported by research conducted by Wulandari, (2020) that the application of the GDL model affects the HOTS of SMA XI students. In addition, the GDL model has a positive effect. That is, in the learning process, the model affects students' willingness to learn and seeks to improve their creative thinking skills (Istiqamah et al, 2016; Ibad et al., 2019; Lestari, 2019). In addition, the SETS approach (science, environment, technology, society) can be used as a learning approach. The focus of SETS education should be on how to enable students to discover coherent knowledge between science, environment, technology, and society (Nikmah & Binadja, 2013; Fatimahwati et al., 2021). Consistent with the goals of the guided discovery learning model, implementation is discovery or teacher-led discovery, meaning that teachers guide students in the right direction and students make discoveries.

The implementation of the SETS learning method can be used as the goal of learning in the era of the 4.0 revolution in the 21st century, based on information technology and science, to improve students' learning outcomes and creative thinking ability (Nuray & Morgil, 2010; Wiasti, 2010; Wiasti, 2018; Akmalia, 2019; Kamilasari, 2020).

Currently, the condition of Covid-2019 is still endemic in Indonesia. In this situation, educational institutions need to innovate in digital-based learning processes. One of them is digital-based teaching materials, namely e-modules (electronic modules). Chemistry e-modules are the latest innovation in print modules, and you can access these electronic modules using a computer with integrated software that helps access the e-modules while studying chemistry. E-modules are also practically used in learning chemistry. This is also supported by the research carried out on the guided discovery learning based chemistry electronics module used during high school/master chemistry study, with high hands-on ability, so it can be used as an alternative teaching material from chemistry study to primary chemistry (Wahyuni & Yerimadesi, 2021). In addition, the chemistry e-module also has very high validity to help the students' chemistry learning process (Khaira et al., 2021).

Based on the explanation of the problems above, this research was conducted with a purpose, namely to reveal the effect of implementing guided discovery learning models assisted by e-chemistry modules with the SETS approach on the creative thinking skills of class XI students at SMAN 1 Padang.

Method

The method used was a quasi-experimental study where the design was randomized only after testing a control group. The subjects of this study are all SMAN1 Padang Class XI students studying in the 2021/202 academic year. It consists of seven classes. The population of this study was randomly divided into two sample classes, an experimental class, and a control class. The process of this design is to use the SETS learning method supported by the Electrochemistry module, using a guided discovery learning model to cover the experimental class. Although the control class is handled according to the traditional model.

The measuring instrument used in this research is a non-test which is used to reveal the creative thinking ability of students. Non-test tools are student portfolio evaluation sheets and creativity evaluation rubrics. The data analysis technique in a study is quantitative data analysis with hypothesis testing. Hypothesis testing, namely the analysis of the average similarity test of two unpaired samples was used. Hypothesis testing was carried out after homogeneity and normality were carried out. The normality test used the Liliefors technique to see if the data were normally distributed. Then continued with the test of uniformity (homogeneity) which was carried out with the test of uniformity of variance. The sample used must have a normal and homogeneous distribution. Based on data analysis, the test was well and evenly distributed so that the test could be continued from two different sample groups.

Result and Discussion

The results were obtained after conducting research, where the experimental class was given treatment, namely by applying the guided discovery learning model assisted by e-chemistry modules with the SETS approach to see how the level of creative thinking skills of students at SMAN 1 Padang.

The student's creative thinking skills in learning can be seen from the application of the SETS approach. In the application of this approach, it provides a stimulus and several applications and problems that must be solved by students based on the concept of the material being studied, namely chemical equilibrium, which can be seen in Figure 1.

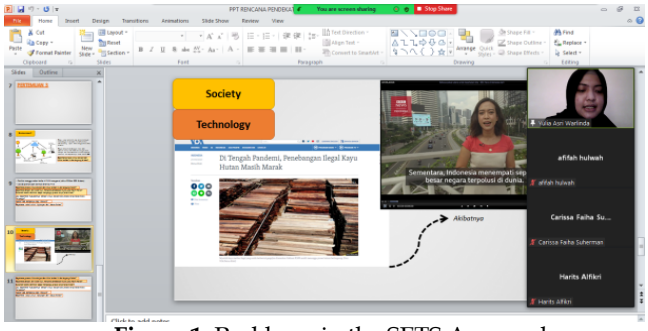

Figure 1. Problems in the SETS Approach

After giving the problem or phenomenon to be solved by students, the solution for each student's answer is in the form of a poster as creativity which is a creative thinking skill. Creative thinking skills are not only seen in the artwork made by students but also seen in how students convey ideas to solve a problem from the given phenomena can be seen in Figure 2.

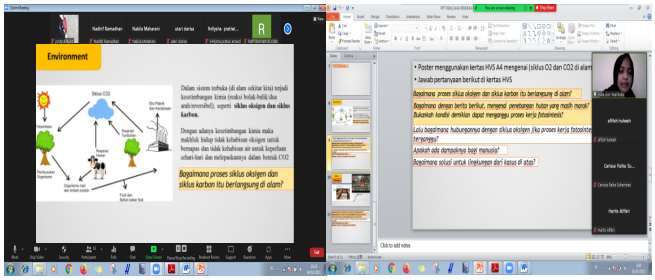

Figure 2. Giving Poster Assignments to See Student Creativity in Solving Problems

The results obtained from the poster scores of each student are then carried out statistically analyzed to see comparison of the level of creative thinking skills of students.

Research result

The comes about of the investigation that has been gotten from the normal comes about of the understudy inventiveness portfolio evaluation sheets which appear the exploratory course gotten a prevalent score. In the following step, from the comes about of the normal score of the understudy imagination portfolio appraisal sheet, theory testing is carried out with the starting arrange of testing the ordinariness of the information utilizing the Liliefors procedure. The comes about of the ordinariness test within the test course are recorded in Table 1.

Table 1. Sample Class Normality Test Results

Class	L_0	L_t	Description
Experiment	0.11	0.14	Normal
Control	0.13	0.14	Normal

The information comes about in Table 1 appear that the two test classes are ordinarily disseminated so that it can be proceeded within the moment arranged, specifically testing the homogeneity of the information utilizing the Fisher/F test method. The comes about of the homogeneity test of the test classes is recorded in Table 2.

Table 2. Sample Class Homogeneity Test Results

Class	Fcount	Ftable	Description
Experiment Control	1.10	1.69	Homogenous

The information in Table 2 appears that the two test classes, the exploratory course, and the control course, have uniform fluctuation. This can be since there's no tall or non-uniform degree of variety within the cruel values of the two test classes. At that point, you'll be able to move on to last level testing, the tests of which are summarized in Table 3.

Table 3. Sample Class Hypothesis Test Results

Class	S	S^2	t_{count}	t_{table}
Experiment	7.11	50.50	1.90	1.66
Control	7.38	54.50		

The comes about of testing the theory show that the investigation theory is acknowledged. This implies that the execution of the guided revelation learning demonstrates/GDL with the SETS approach utilizing the chemical e-module includes a noteworthy impact on the inventive considering aptitudes of course XI understudies of SMA Negeri 1 Padang.

Discussion

The results of the handling of information and the investigation carried out showed that there were critical differences in information about the imaginative thinking ability of students from the two test classes. The appearance of the information obtained in the experimental lesson comes to the next normal rather than in the control lesson. The normal score for the test subjects is 84.14, while the normal score for the control lesson is 81.11. Another, analyze the contrast between factual midpoints, specifically typical tests, and homogeneity. Testing is carried out to create information that is usually disseminated for uniform fluctuations contained in Tables 1 and 2, so that the information is continued with theoretical testing.

Table 3 appears the comes about of calculations for theory testing gotten $t_{count}>t_{table}$ which can be concluded that the inquiry about speculation is acknowledged. In other words, the usage of the guided revelation learning demonstrate incorporates a critical impact on the imagination considering the aptitudes of the populace test. This noteworthy distinction was caused by the distinctive treatment classes given to the two classes of tests. Within the exploratory lesson, the treatment connected was a guided disclosure learning model with the SETS approach helped by an e-chemistry module,

whereas within the control lesson ordinary demonstration or learning demonstration was connected which is ordinarily utilized upon by the SMAN 1 Padang educator to educate. This was brought about within the separation of inventive considering aptitudes of lesson XI understudies at SMAN 1 Padang expanded.

The difference in students' creative thinking abilities is due to the experimental class using a guided discovery learning model supported by chemistry e-modules in the learning process. Of course, the process of forming creativity must be facilitated by meaningful learning. Such learning can improve students' abilities in basic understanding and thinking skills, including the ability to analyze, evaluate, and ultimately bring out students' creativity. With the use of teaching materials in the form of e-modules that are used as a substitute for books and print modules without limiting their function as a source of information (Handayani, 2021). The use of e-modules can also be used outside or inside the classroom. Students can study material and theory outside the classroom and practice in the classroom under the guidance of a teacher (Herala et al., 2015; Aziz 2020; Kusumawati, 2021).

By presenting the results of problem-solving, understanding the issues raised in the discussion, and answering questions, you will acquire creative thinking skills. In answering questions there is also a collaboration between students (collaboration ability). Assigning students to use technology when communicating problem-solving results. So, it takes an effort to improve students' creative thinking skills, namely learning models. One of the learning models that can be applied is the guided discovery learning model. This is also supported by research conducted by (Afian et al., 2017; Dewi et al., 2017; Permatasarie et al., 2021) concluding that learning by applying the GDL model has a positive effect on creative thinking skills and mastery of concepts. And it is also in line with research (Yerimadesi et al., 2018; Bayharti et al., 2019; Yerimadesi et al., 2019a; 2019b), which concludes that the guided discovery learning model or abbreviated as the GDL model is one of the most popular models has a high level of validity, practicality, and effectiveness.

By implication, the accomplishment of fabulousness in students' imaginative considering abilities is backed and suited by each GDL to demonstrate language structure amid the learning handle. Understudies take an interest effectively within the learning preparation through disclosure exercises such as reflection, reflection, experimentation, and investigation exercises. This action provides opportunities for understudies to require illustrations from standard of, living particularly to hypothesize and test, as well as associated and get it the anticipated execution (Balim, 2009).

Not as it were applying for the GDL learning show so that understudies are prepared autonomously but too helped with instructing materials such as e-modules based on the GDL demonstrate as an advancement in educating materials to form ideal and proficient communication between instructors and students within the learning handle. Usually backed by past considers which appeared that e-chemistry modules were suitable and successful within the learning prepare to progress learning results and inventive considering abilities of understudies (Suhendri, 2019; Romayanti, 2020; Asda, & Andromeda, 2021).

The distinction in students' imaginative considering capacities is as it were caused by the exploratory lesson utilizing the guided revelation learning demonstrate upheld by the chemistry e-module within the learning preparation. In any case, there are too suggestions for the application of the SETS approach within the learning prepare. Because in the learning process, creative thinking is simply defined as the ability of a student to create or find something useful. This skill refers to the ability of learners to solve complex problems based on real-world situations. Students with creative thinking skills tend to come up with interesting and simple ideas to answer existing problems, both phenomena that occur and symptoms that occur. Therefore, the combination of art and technology can make learning more flexible and stimulate student innovation and creativity (Chung et al., 2020). Therefore, in learning it is necessary to combine the SETS approach (Science, Environment, Technology, Society).

The SETS approach is a learner-centered approach, where students are trained to think comprehensively and solve problems by applying their own concepts. This approach aims to provide contextual scientific learning. Students are placed in situations where they can use scientific concepts in the form of technology to benefit people, and are asked to think about possible consequences. The result of the process of turning Science into technology. The characteristic of SETS learning is that the scientific concepts taught are not introduced purely as scientific concepts, but are associated with other SETS elements (Kalsum et al., 2019). Consistent with previous research which showed differences in students' creative thinking abilities before and after practical learning (Yusro, 2017; Kalsum et al., 2019). This makes the difference in the mean of the two sample classes.

Conclusion

The findings of the study described and explained above concluded that the implementation of a guided discovery learning model using the SETS method supported by the chemical Young's modulus had a

significantly higher impact on the creative thinking skills of students in class XI at SMA Negeri 1 Padang.

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