JPPIPA 9(10) (2023)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Influence of Models Discovery Learning to Critical Thinking Ability and Scientific Attitude of Students

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Received: July 25, 2023
Revised: September 26, 2023
Accepted: October 25, 2023
Published: October 31, 2023

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DOI: 10.29303/jppipa.v9i10.4792

Abstract: This study aims to determine critical thinking skills and scientific attitudes, determine students critical thinking skills, determine attitudes scientific, know the effectiveness of the discovery learning model to students' critical thinking skills and scientific attitudes and know the comparison of scientific attitudes. This research is included in the type of quasi-experimental research. The research design used was a posttest only design. The population in this study were all students in class XI IPA in Senior High School. The sample in this study were students of class XI IPA at SMAN 1 Selong. The research sample was taken by random sampling to class. The research instruments used were critical thinking ability questions, scientific attitude used questionnaires and observation sheets. The results of the research show that there are differences in the ability to think critically and the scientific attitude, there is a differen in the ability to think critically, there is a difference in scientific attitudes, the percentage contribution of model to student' critical thinking ability and scientific attitude 31.9%, critical thinking ability 26.1% and scientific attitude 6.7%, scientific attitude profile of discovery learning model is better than 5M scientific approach.

Keywords: Critical thinkin; Discovery learning model; Scientific approach 5M; Scientific attitude.

Introduction

Currently, education is in the knowledge age which is indicated by the extraordinary acceleration of knowledge increase. The knowledge age is also known as the 21st century (Arifin, 2017). The 21st century is referred to as the century of openness or the century of globalization, meaning that human life in the 21st century has undergone fundamental changes that can be said to be different from life in the previous century. The fourth industrial revolution in the 21st century was marked by technological advances through intelligence engineering and the Internet of Thinking (IoT) while the world of education has entered the fifth revolution which was marked by the use of computer and internet facilities in the learning process (Azhary, 2021).

Education in the 21st century has undergone transformation in various forms such as students are required in learning activities to participate actively (Chusni et al., 2020). In addition, in the learning process in the 21st century, educators and students are required to have learning and teaching skills, namely soft skills and hard skills. This ability is very important to have in the world of education in Indonesia because the world of education in the 21st century has experienced developments and advances in science, technology, information and communication (Sumar et al., 2020), so that in the 21st century education has an important role to play form students who have learning and innovation skills, as well as skills in using information technology and media. Education has a role to produce students who are expected not to fall into the flow of wrong information so that they become quality human resources (Arifin, 2017).

The purpose of education is not only to increase the competency of students in concepts in the field of science (aspects of knowledge), but also to produce young people who will later become agents of change, with

How to Cite:
Nursakinah, S., & Suyanta, S. (2023). Influence of Models Discovery Learning to Critical Thinking Ability and Scientific Attitude of Students. *Jurnal Penelitian Pendidikan IPA*, *9*(10), 8879–8889. https://doi.org/10.29303/jppipa.v9i10.4792

character and culture in facing future challenges (Budaya & Abad, 2018**).** The educational challenges that must be faced in 21st century life where technology-based learning is that students are required to have 21st century skills. There are several skills that students must possess in the 21st century era including life and critical skills, learning and innovation skills. (learning and innovation skills), critical thinking and problem solving skills (critical thinking and problem solving), communication and collaboration skills, information media and technology skills or what is commonly called 4C **(**Mardhiyah et al., 2021). These important skills in the 21st century are relevant to the four pillars of life which include learning to know, learning to do, learning to be, and learning to live together (Dikta, 2020). These skills are urgently needed considering that students are currently in the modern era which is controlled by the rapid flow of information so it is hoped that the world of education can prepare students to master these various skills in order to become successful individuals in life (Rusadi et al., 2019).

One of the important skills that students must have in 21st century skills is CTS (critical thinking skills) (Chusni et al., 2020). The ability to think critically is one of the important skills that every student in the class must have and has the benefit of enabling students to learn effectively and contribute actively in their daily lives (Afify, 2019). Critical thinking ability is the ability to think logically, reflectively, and productively which focuses on determining what to believe or do which is then applied in assessing situations to make good judgments and decisions. Critical thinking ability is one of the higher order thinking skills that requires students to be active learners because students are required to have the ability to analyze, evaluate, and create. Students who have critical thinking skills make it easy for students to process the information they find and use it to solve problems and can avoid making wrong decisions (Afshar et al., 2017).

One of the important skills that students must have in 21st century skills is CTS (critical thinking skills) (Chusni et al., 2020). The ability to think critically is one of the important skills that every student in the class must have and has the benefit of enabling students to learn effectively and contribute actively in their daily lives (Afify, 2019). Critical thinking ability is the ability to think logically, reflectively and productively which focuses on determining what to believe or do which is then applied in an important aspect for the process of student development in dealing with the demands of the development of the 21st century in addition to the ability to think critically, namely a scientific attitude. A scientific attitude is one of the character education that students must have so that students can learn to implement a scientific attitude in everyday life (Wildan et al., 2019).

(Revati & Meera, 2017) state that a scientific attitude is a person's ability objectively in expressing everything around their environment based on the knowledge they have and people who have a scientific attitude will be oriented towards conducting experiments (experiments), systematic in approach and have an attitude open to science. So it can be concluded that scientific attitude is individual behavior when solving a problem through scientific steps that are systematic and based on proven principles and not principles that have not been clearly verified. Scientific attitude is expected to make students active and creative in learning. In general, students who have a good scientific attitude have high academic achievement as well. So in the learning process, the development of a scientific attitude affects the achievement of learning outcomes which include students' cognitive, affective and psychomotor aspects.

The aspects of scientific attitude include curiosity, respect for facts or evidence, willingness to change views, and critical thinking (Ananda et al., 2022). With a scientific attitude embedded and developing in students, students are expected to be able to be sensitive to the environment, able to find out what they find, what they don't know and students are expected to be able to act and solve problems in the environment with their own abilities. Therefore, the aspect of scientific attitude is very important to develop in a science lesson, one of which is in chemistry learning because attitude is the foundation for students to be able to respect the work of others and respect their own work (Fahrunisa et al., 2020).

Chemistry is one of the clusters of natural sciences (IPA). As one of the natural sciences, chemistry is seen as a process and a product. Chemistry subjects in SMA/MA aim that students have the ability to form a positive attitude towards chemistry and realize the order and beauty of nature and glorify the greatness of God Almighty, cultivate a scientific attitude, namely honest, objective, open, tenacious, critical, and able to work together with others, gain experience in applying the scientific method through experiments or experiments, raise awareness about chemical applications that can be beneficial as well as detrimental to individuals, society and the environment and realize the importance of managing and preserving the environment and people's welfare, and understand concepts, principles, law, and chemical theory as well as their interrelationships and their application to solving problems in everyday life. This shows that chemistry is very important to learn in school (Setiadi & Irhasyuarna, 2017).

But in reality, high school students are less interested in chemistry lessons because students think that learning chemistry is difficult to understand because chemistry is learning that is relatively complex and can not only be understood through theory, but needs to be studied through three aspects, namely macroscopic, microscopic, and symbolic (Alvi & Yerimadesi, 2022). One of the chemistry subject matter studied by high school students is a buffer solution. Buffer solution is one of the chemicals that have a relationship with everyday life. Buffer solution material requires an understanding of concepts that contain many complex abstract concepts. Learning buffer solution material requires explanations in various forms of representation that can visualize buffer solution material so students are expected to be able to observe the symptoms that occur and analyze and draw more comprehensive conclusions (Haryati et al., 2020).

Students consider that the material for buffer solutions is difficult because of the complex nature of the material and use a lot of mathematical calculations and work on problems. In addition, research conducted by (Sariati et al., 2020) found difficulties in understanding buffer solutions including: the concept of understanding buffer solutions, calculating the pH and pOH of buffer solutions using the principle of equilibrium and calculating the pH of buffer solutions when adding a small amount of acid or base. The difficulty of chemistry material for students is caused by the teacher's lack of concrete examples of chemical material in the surrounding environment. In addition, in learning chemistry, teachers generally emphasize memorization and calculations and are not accompanied by an in-depth understanding that can be applied when dealing with real situations (Fauzi & Respati, 2021).

Chemistry learning should not only require students to learn more about scientific concepts and principles verbally, memorizing and introducing formulas. However, in learning chemistry students should be equipped with knowledge, understanding and a number of abilities to think, work and act scientifically and communicate as one of the important aspects of life skills. Besides that, in chemistry learning it is necessary to emphasize providing direct learning experiences to students and implementing activities that can train students' critical thinking skills and scientific attitudes so that later students can use their chemical knowledge in everyday life and also remember critical thinking skills and scientific attitudes.

One of the skills and characters that students must have in 21st century learning and critical thinking is one aspect of a scientific attitude. However, in reality, the critical thinking skills of SMA/MA students are still low and students' critical thinking skills are not trained in the learning process. This can be seen from the results of the 2018 Program for International Student Assessment (PISA) released by the Organization for Economic Co-operation and Development (OECD) 2019 which shows that the ability of Indonesian students in reading mathematics and science has decreased. In the field of reading, the average score is 371, mathematics is 379 and for science, the average student score is 396 (OECD, 2019).

The decline in the PISA score is a cause for concern for Indonesian education and these results indicate that students' critical thinking skills are still low (Dewi et al., 2022). Likewise with students' scientific attitudes, in learning the emphasis on scientific attitudes is rarely carried out by teachers because they only emphasize cognitive aspects and learning outcomes without looking at students' scientific attitudes. Learning should seek to cultivate a scientific attitude because students with a good scientific attitude will have a great curiosity about a problem. The research that has been conducted by Kusherawati et al. (2020) shows that students' scientific attitudes are still relatively low due to the lack of optimization of learning that involves students.

Based on interviews that were conducted with Chemistry teachers at SMAN 1 Selong, most of the chemistry teachers at SMAN 1 Selong used the lecture method in teaching so that learning was still teacher centered and teachers only transferred knowledge to students in one direction. This one-way learning makes the teacher not guide students in discovering the concepts they learn on their own so that learning in class tends to be passive. Students get information only based on the teacher's explanation so that students listen more, only a few students actively ask questions. The learning carried out by the teacher has not trained critical thinking skills so that students are not used to thinking critically in solving problems, giving arguments, giving conclusions and are not used to discovering the concepts of the material being studied for themselves. In addition, based on the results of interviews with chemistry teachers at SMAN 1 Selong, chemistry teachers also pay less attention to assessing scientific attitudes in the chemistry learning process, so that students' scientific attitudes are not optimally shown. Related to this problem, critical thinking skills and scientific attitudes in chemistry learning need to be optimized by applying innovative learning models, so that learning takes place optimally and is able to develop students' critical thinking skills and scientific attitudes. One of them is by applying the discovery learning model.

The discovery learning learning model is a two-way learning system with a learning process that involves students and teachers. Students make discoveries and the teacher guides students in making discoveries. So in the discovery learning learning model students are encouraged to study independently. Therefore, in

learning students are required to be able to think critically in answering the various problems presented (Utami et al., 2022). The impact felt by students by using the discovery learning learning model is that it is able to develop students' critical thinking skills and students' scientific attitudes. This is because the discovery learning learning model has stages that can train students to think critically and students' scientific attitudes. Like the research that has been conducted by Winoto & Prasetyo (2020) which states that the discovery learning learning model has a positive influence on students, namely it can improve student learning outcomes and students' critical thinking abilities with an average of 80.57. Likewise with research conducted by Asmarani et al. (2017) which states that the discovery learning model can improve students' scientific attitudes with an average score of 20.99 which is quite good.

From the background above, research is carried out by applying the discovery learning model in chemistry learning which can train students' critical thinking skills and students' scientific attitudes. The chemical material that will be applied to the discovery learning model in this study is the buffer solution material because based on interview results, the chemistry teacher at SMAN 1 Selong has not applied the discovery learning model to this material and only emphasizes memorizing formulas and exercises so that the title to be studied namely "The Effect of the Discovery Learning Learning Model on Critical Thinking Ability and Scientific Attitude".

Method

This research is quasi-experimental research. The research design used is the posttest only design. This research consists of two classes, control class and the experimental class**.** This research was conducted at SMAN 1 Selong in class XI IPA. The population in this study were all students of class XI IPA. The sample in this study were students of class XI IPA at SMAN 1 Selong. Two classes were used as research samples, so there was an experimental class and a control class totaling 72 students. The research sample was taken by random sampling to class. The research variables consist of two variables, namely the independent variable and the dependent variable. The independent variable in this study is the learning model, while the dependent variable in this study is the ability to think critically and scientifically.

Data collection techniques used in this study are test techniques and non-test techniques. The instrument used in collecting students' critical thinking data is a matter of critical thinking skills. The scientific attitude assessment technique used is a student scientific attitude questionnaire. The scientific attitude questionnaire sheet is composed of several statements with four answer criteria. This scientific attitude questionnaire sheet was filled out by students in the experimental class and control class at the last meeting. Instruments used to retrieve data from previous studies must be tested for validity and reliability. The research instrument was validated using theoretical validity and empirical validity. The data obtained from the results of the research were then analyzed using descriptive analysis and statistical analysis of Manova with the help of the IBM SPSS Statistics 26 program.

Result and Discussion

This study aims to test the hypothesis of the application of the discovery learning model to students' critical thinking skills and scientific attitudes compared to the scientific approach (5M) on buffer solution material. So two groups of students were given different treatment in the form of a discovery learning model in the experimental class and the 5M model in the control class. The research data were obtained from research instruments consisting of posttest critical thinking skills, questionnaires and observation sheets for scientific attitudes.

First Hypothesis Test Results (Differences of Discovery Learning Model and 5M on Critical Thinking Ability and Scientific Attitude)

The presence or absence of differences in discovery learning and 5M learning models on critical thinking skills and scientific attitudes can be determined using the Manova test. The Manova statistical test used is the Hotelling's Trace test because in this study two groups of independent variables were used and the homogeneity of the covariance matrix was met. The Manova test was carried out with the help of the IBM SPSS Statistics 26 program using a significance level of 5% (0.05). If the significance value (p) > 0.05 then Ho is accepted and vice versa if the significance value obtained is (p) <0.05 then it can be said that Ho is rejected which indicates there are differences in critical thinking skills and scientific attitudes of students who apply the discovery learning model learning with the 5M model.

Based on the Manova test, a significance value of 0.000 was obtained, which was less than 0.05, so it could be concluded that Ho was rejected, namely that there were differences in the use of learning models on students' critical thinking skills and scientific attitudes simultaneously (simultaneously). If seen from the partial eta squared value, the contribution of the discovery learning model to students' critical thinking skills and scientific attitudes is 31.9%. The results of this study are in line with research conducted by Amin et al. (2022) and research conducted by Dewi et al. (2017) which state

that learning using the discovery learning model can encourage students to be able to develop students' critical thinking skills and scientific attitudes.

The application of the discovery learning model can improve critical thinking skills. This is because the application of this model can make students accustomed to and learn to solve a problem related to the learning provided, besides that students can explore concepts more deeply so that students can anticipate and avoid misinterpretation related to the information obtained. Through these activities it can train students' critical thinking skills during the learning process (Zul Hanifah et al., 2017). In addition to being able to improve critical thinking skills, the discovery learning model can also improve problem solving abilities because the discovery learning model has stages such as the data collecting stage and the information processing stage (data associating) which expect students to be able to find concepts through experimental activities as well as discussion activities on student worksheets that can guide and direct students so they can find the concepts they learn.

The application of the discovery learning model trains students in learning to overcome the problems encountered in the learning process. Giving problems to students can increase curiosity in students which makes students more active in asking questions when the learning process is in progress and trying to get solutions related to problems encountered in learning. Giving problems to students also makes students carry out an investigative process which has a positive impact on scientific attitudes (Safitri et al., 2022). Students who have good scientific attitude skills will find it easier to understand and solve a problem related to critical thinking skills in using their knowledge to find solutions and answers to the problems they face (Erdogan, 2019). This shows that the application of the discovery learning model has an influence on students' critical thinking skills and scientific attitudes.

Results of the Second Hypothesis Test (Differences of the Discovery Learning Model and the 5M Model on Critical Thinking Ability)

Differences in critical thinking skills between students who apply the discovery learning learning model and students who apply the 5M model are analyzed by the Manova test which is seen in the output test of between subject effects. Based on the output of the test of between subject effect, a significance value (p) was obtained which was 0.000 <0.005 so it could be concluded that Ho indicated that there were differences in critical thinking skills between students in the experimental class and students in the control class. When viewed from the partial eta squared value, it shows that the discovery learning model contributes 26,1%. In addition, the description data also shows that the average values obtained by the two classes indicate that the experimental class has a higher final test score than the control class so that based on the results of the analysis, chemistry learning on buffer solution material with the application of discovery learning has an influence on thinking skills critical students.

The application of the discovery learning model in the learning process can indirectly familiarize students with being actively involved in the learning process and can train students' critical thinking skills because the stages of the discovery learning model support students to think critically. The discovery learning model can improve students' critical thinking skills because during the learning process students are trained to observe, ask questions, collect information, try, reason, communicate and conclude (Syawaludin et al., 2022). Students will be given stimulation at the beginning of learning in the early stages, namely stimulation. Stimuli given in the form of pictures, discourse and questions. Providing stimulation aims to build initial concepts of understanding material which helps students explore materials related to material (Safitri et al., 2019).

Learning with the discovery learning model can encourage and demand students to be actively involved in the learning process because in learning knowledge is not presented directly by the teacher to students so that the main task of students is to find their own knowledge concepts either through discussion, experimentation or interpretation (Asriningsih et al., 2021). Learning using the discovery learning model also provides opportunities for students to be able to express their opinions freely, process the information obtained and discuss it with the group so that they can train students' critical thinking skills. As said by Hidayat et al. (2019) that the implementation of learning that provides opportunities for students to express opinions and exchange information during group discussion activities not only increases students' understanding of learning material but can also improve students' critical thinking skills. In addition, through the discovery learning model, it trains students to reason, think critically and analyze and provides opportunities for students to manage the information they receive and then discuss it with their group mates (Pratiwi, 2014). Critical thinking skills can also be stimulated in learning activities with the discovery learning model through a process of solving problems and finding solutions from various ideas and opinions for these problems (Wulandari & Totalia, 2016).

The effectiveness of the discovery learning model on students' critical thinking skills is strengthened by previous studies. Research conducted by Nurcahyo et al. (2018) which shows that the discovery learning model can improve students' critical thinking skills.

Furthermore, research conducted by Oktaviani et al. (2021) and research by Rahayu and Kuswanto (2021) whose research results are the discovery learnihng model can improve students' critical thinking skills. Ainur et al. (2021), Roniati (2023) and Devi et al. (2015) show that discovery learnihng model can improve students' critical thinking skills. Sonya (2022) determine that student worksheets based on guided discovery learning to improve students' critical thinking skills.

Results of the Third Hypothesis Test (Differences of the Discovery Learning Model and the 5M Model on Scientific Attitudes)

Differences in the scientific attitude of students who apply the discovery learning learning model with students who apply the 5M model are analyzed using the Manova test by looking at the output value on the test of between subject effects. Differences in students' scientific attitudes in the experimental class and the control class also show that there are significant differences. This difference is proven through the acquisition of a significance value that is equal to 0.028 <0.05, so that Ho is rejected, namely there are differences in scientific attitudes between students in the experimental class and students in the control class. When viewed from the partial eta squared value, it shows that the discovery learning model contributes 9,8%.

There is a difference in the scientific attitude of students in the experimental class and the control class because during the learning process using the discovery learning model, students undergo a series of learning processes that train students to think rationally and empirically so that an attitude called scientific attitude develops. The application of the discovery learning model in a learning process can develop a scientific attitude from students because in the learning process it encourages students to carry out experiments, discoveries and scientific discussions with their group mates. Students' scientific attitudes can be shaped and developed by carrying out scientific activities such as scientific discussions and conducting experiments Ramdani et al, 2021).

A scientific attitude is an attitude of accepting opinions from other people well, acting systematically accompanied by scientific steps in solving a problem, not knowing despair and being diligent and open. A scientific attitude is also an attitude that must exist in a scientist when facing a scientific problem (Ulfa, 2018). The indicators of scientific attitude which measure scientific attitude in this study are curiosity, objectivity, critical thinking, openness, honesty, discovery and responsibility. This can be seen in the stages of the discovery learning model.

An attitude of curiosity is a character of students who need to be developed in learning. Curiosity can arise if you see a motorcycle taxi or the like. Students who have curiosity means students will become increasingly understanding various kinds of concepts in natural phenomena and make students more aware of the truth of the concept and the attitude of wanting to get the correct answer from the object being observed (Sari & Lahade, 2022). Students' curiosity can arise at the stage of the discovery learning model, such as at the stimulus stage (stimulation). Students at the stimulation stage are given a stimulus in the form of questions or problems and then students are given the opportunity to ask questions and argue related to the problems given at the stimulus stage.

Students then make a problem statement at the problem statement stage where the problem statement made becomes a reference for students to make a hypothesis or temporary answer. The formulation of problems and hypotheses that have been made by students can foster students' curiosity because it makes students think and are curious about the truth of the problem formulation and hypotheses they make. Students also carry out experimental and discovery activities at the stage of collecting and processing data which will arouse students' curiosity. Likewise, at the verification stage and drawing conclusions, students' curiosity will also develop.

The stages in the discovery learning model can alsofoster and develop students' critical thinking attitudes. Students' critical thinking attitudes can be formed at the stages of stimulation and problem identification. Students who have a critical thinking attitude will look for evidence in support of an opinion to be conveyed and students must be guided when looking for evidence of the opinion to be conveyed (Andayani, 2020). The stages of the discovery learning model such as the stages of data collection, data processing, verification and generalization can also bring about an open attitude and a sense of responsibility in students. Students who have responsibility will be actively involved in their groups and accept suggestions, criticisms and feel they are not the most correct in their groups. Someone who has an open attitude will also be willing to change his mind if there is more valid evidence submitted by others (Ulva, 2017).

The effectiveness of the discovery learning model on students' scientific attitudes is strengthened by previous research. Like the research conducted by Soenarko et al. (2022) conducted research on the application of the discovery learning model and its effect on understanding students' scientific concepts and attitudes. The results of this study indicate that students' scientific attitudes are in the very good category by

learning using the discovery learning model. In addition, research conducted by Sugiarti et al. (2019) conducted research on knowing the differences in the scientific attitudes of students who used the discovery learning model and the direct learning model. The research results show that the discovery learning model can improve students' scientific attitudes. Hasbiyai et al. (2022) also that there is an influence on the scientificattitudes of students in science learning using discovery learning-based environmental pollution digital books and research by Istiqamah et al. (2016) show that discovery learning model and experiment-based guided inquiry influence on physics learning outcomes and students' scientific attitudes.

Profile of Scientific Attitudes of Learners

The scientific attitude profile of students in the experimental class and control class was analyzed using quantitative descriptive. The scientific attitude profile of students is reviewed based on the results of the average scientific attitude score in each class and the percentage of students' scientific attitude scores for each aspect in each class. The results of the average scientific attitude score in each class can be seen in the Figure 1.

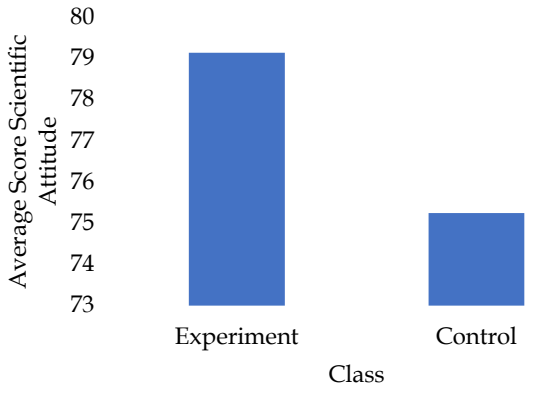

Figure 1. Scientific Attitude Profile Based on Average Score Scientific Attitude of Learners

Based on Figure 1, it can be seen that the average score of students' scientific attitudes in the experimental class is higher than the control class. Further analysis was carried out by counting the number of students who had scientific attitude criteria ranging from very good to very poor categories and then making the ideal percentage in each class for comparison. The results of the analysis can be seen in Figure 2.

Figure 2 shows that students who apply the discovery learning model are dominant in the good and sufficient categories, while students who apply the 5M model are more dominant in the less category. So it can be said that the scientific attitude of students who use the discovery learning learning model is better than students who use the 5M model.

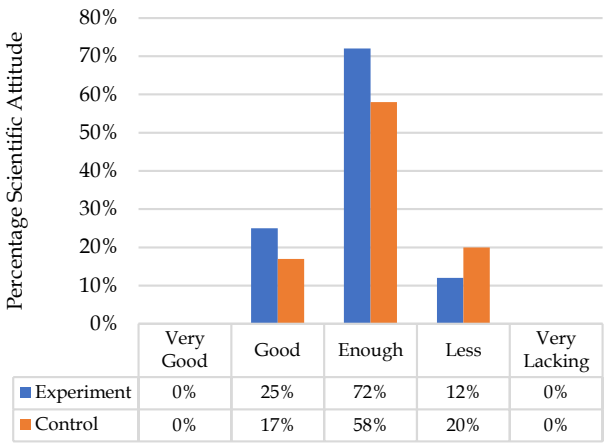

Figure 2. Scientific Attitude Profile Based on Score Percentage Scientific Attitude of Learners

The profile of students' scientific attitudes was analyzed based on the average score of scientific attitudes and the percentage of students' scores in each aspect of scientific attitude in each class, namely the experimental class and the control class. If seen from the comparison of the average score of students' scientific attitudes which can be seen in Figure 1, it shows that the scientific attitude of students who use the discovery learning model is higher than students who use the 5M scientific approach model. Likewise with the scientific attitude profile of students who were analyzed based on the percentage of ideal scores in each class which can be seen in Figure 2. Students who use the discovery learning learning model are dominant in the good and sufficient categories while the 5M scientific approach is dominant in the less category. There are differences in the scientific attitude of these students because of the different treatment of each class. The use of discovery learning models has a positive impact on students' scientific attitudes.

The scientific attitude of students in each class can also be seen from the results of observations which show that aspects of scientific attitudes consist of curiosity, objectivity, critical thinking, openness, honesty, discovery and responsibility in classes that apply higher discovery learning models compared to classes that apply the 5M scientific approach. Aspects of the scientific attitude of students who use the discovery learning model are above 70% while the average aspect of the scientific attitude of students who use the discovery learning model is above 40%. The percentage of students' scientific attitude scores in the two classes shows that there is a difference. This supports the results of previous studies which show that the use of discovery learning models has an influence on students' scientific

attitudes. Someone who has a scientific attitude will have a curiosity to know more and deeper about the events around him

With the application of the discovery learning model in the learning process it will bring out the curiosity of students to be able to discover new things that they do not know so that they can improve the scientific attitude of students. The results of this study are in line with research conducted by Asmarani et al. (2017) which states that the application of the discovery learning model can improve students' scientific attitudes. The discovery learning model requires students to find concepts and understand material through a series of data and information obtained based on observations or experiments in the learning process that can develop students' scientific attitudes. In this study, there are seven aspects of scientific attitude that are used, one of which is the aspect of curiosity. The problems given by the teacher in the process of learning activities using the discovery learning model will encourage students' curiosity. As research conducted by Oktaviani et al. (2021) that the discovery learning learning model can increase students' curiosity to learn and connect science with everyday life. This is also supported by Gelstrap & Martin's theory in Esti (2009**)** which states that the importance of using discovery learning can arouse students' curiosity and can motivate them to continue their work until they can find answers.

Conclusion

Based on the results of the research and discussion that has been described, it can be concluded that there are differences in the ability to think critically and the scientific attitude of students who apply the discovery learning model and the 5M scientific approach, there is a significant difference in the ability to think critically between discovery learning model and 5M scientific approach, there are significant differences in scientific attitudes between discovery learning model and 5M scientific approach, the percentage contribution of the discovery learning learning model to the critical thinking skills and scientific attitudes of is 31,9%, critical thinking skills are 26,1% and scientific attitudes are 9,8% and the scientific attitude profile of students who apply the discovery learning model is better 5M scientific approach.

Acknowledgments

The researcher would like to express gratitude to all parties involved, starting from the school principal of Senior High School 1 Selong, chemistry teachers, and student who participated in the research process. Also heartfelt thank you to Prof. Dr. Suyanta, M.Si , as the supervising lecturers. Thanks are also extended to Dr. Marwati, M.Si and Prof. Dr. Sriatun, M.Si as validators.

Author Contributions

Conceptualization, S.N, S.; methodology, S.N, S, E.R, A.W,; validation, S, M, ; resources, S.N, E.R, S,; data curation, S, A.W. M,; writing—original draft preparation, S,; writing—review and editing, S.

Funding

This research received no external funding

Conflicts of Interest

The authors declare no conflict of interest.

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