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The Effect of Inquiry Learning on Students' Critical Thinking Ability on the Topics of Regulation System

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Abstract: Inquiry learning strategies are a series of learning activities that emphasize the process of thinking critically to find and find for yourself the answer to a problem in question. This study aims to determine the influence of inquiry learning strategies on the critical thinking ability of class XI science students of MIA Al-washliyah Kedaisianam. This research is in the form of quantitative research with a Quasi-experimental approach. The head of this study is students of class XI MIA 1 and XI MIA 2 Madrasah Aliyah Al-washliyah Kedaisianam Batu Bara school year 2022/2023. The design of this study is The Non-Equivalent Pretest Control Group Design. Data on students' critical abilities were collected using questionnaires. For then the research results obtained from the Non-test questionnaire in the experimental class and control class.Then the data obtained in the critical thinking ability analysis test of students of the two research classes were declared normally distributed and homogeneous and for the hypothesis test showed that the calculation of 20.071 > t_{tabel} 1.669, then it can be categorized as having an influence. And for a significant degree of < 0.05 where 0.000 < 0.05, then H_0 is rejected and Ha is accepted and concluded there is an influence of inquiry learning strategies on students' critical thinking ability on regulatory system materials.

Keywords: critical thinking, inquiry learning strategies, regulatory systems.

Abstrak: *Strategi pembelajaran inkuiri merupakan serangkaian kegiatan pembelajaran yang menekankan pada proses berpikir secara kritis untuk mencari dan menemukan sendiri jawaban dari suatu masalah yang dipertanyakan. Penelitian ini bertujuan untuk mengetahui pengaruh strategi pembelajaran inkuiri terhadap kemampuan berfikir kritis siswa kelas XI IPA MIA Al-washliyah Kedaisianam. Penelitian ini berupa penelitian kuantitatif dengan pendekatan Quasi eksperiment. Sampel penelitian ini adalah siswa kelas XI MIA1dan XI MIA2 Madrasah Aliyah Al-washliyah Kedaisianam Batu Bara tahun ajaran 2022/2023. Desain penelitian ini adalah The Non-Equivalent Pretest Control Group Design. Data kemampuan kritis siswa dikumpulkan menggunakan angket. Untuk kemudian hasil penelitian yang diperoleh dari angket Non-test pada kelas eksperimen dan kelas kontrol. Kemudian data yang diperoleh pada uji analisis kemampuan berpikir kritis siswa dua kelas penelitian dinyatakan berdistribusi normal dan homogen dan untuk uji hipotesis menunjukkan bahwa thitung 20.071 > ttabel 1.669,maka dapat dikatagorikan memiliki pengaruh. Dan untuk taraf signifikan <0,05 dimana 0,000 < 0,05, maka H0 ditolak dan Ha diterima dan disimpulkan terdapat pengaruh strategi pembelajaran inkuiri terhadap kemampuan berpikir kritis siswa pada materi sistem regulasi.*

Kata kunci: *berpikir kritis, strategi pembelajaran inkuiri,sistem regulasi.*

▪ INTRODUCTION

Education is a conscious effort to create a learning atmosphere so that students actively develop their potential to have spiritual, religious, self-control, personality, intelligence, noble character of students, and the skills needed by themselves and society. Educators also make this generation a role model figure from the teaching of previous generations. Until now, education has no limit to explain the meaning of

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education completely because of its complex nature as its target is human. Its complex nature is often referred to as the science of education (Rahman et al, 2022)

Education in the 21st century can lead us to a dramatic paradigm shift, from an industrial society to a science society or a learning society. 21st century skills emphasize that 21st century learning must teach 4 competencies, namely communication, collaboration, critical thinking and creativity.To face the learning challenges of the 21st century, everyone must have critical thinking skills, knowledge and abilities in digital literacy, information literacy, media literacy and mastery of information and communication technology.One of the 21st century abilities that must be mastered is critical thinking skills. Critical thinking skills include the ability to access, analyze, synthesize information that can be taught, trained and mastered (Redecker et al, 2011).

Critical thinking is the process of formulating reasoning that is orderly actively and skillfully drafting, applying, analyzing, integrating (synthesis), or evaluating information collected through the process of observation, experience, reflection, reasoning or communication as a basis for determining actions.Critical thinking is very important for students to have, because it allows students to be able to solve social, scientific and practical problems effectively by students (Johnson,2011). It is said that if education is a unit that belongs in part to life, education has graced the long road in human life from lawal to end. Education is also a loyal companion and a human need. V.R Taneja, quoting proopert Lodge's statement, that life is education is life It means that the story of human beings always often coincides with education, and vice versa (Munir, 2018).

Inquiry learning strategies are a series of learning activities that emphasize the process of thinking critically and analytically to find and find for yourself the answer to a problem in question. The thought process itself is usually done through question and answer between teachers and students (Sanjaya, 2011). Critical thinking skills that are focused on decision making Critical thinking skills cannot just appear, but need to be honed continuously, especially honing attitudes and behaviors that support a person to have critical thinking skills (Nandhita, 2018). And as for the benefits of critical thinking of students so that later when in one education unit is able to realize the abilities they have to produce students who are component in accordance with educational goals (Syafitri, 2021).The problems that cause low critical thinking ability in students are the inaccuracy of teachers in choosing learning strategies, namely the ways used in the learning process to achieve the learning objectives that have been set (Kartini, 2019).

Based on research conducted by (Wale & Bishaw, 2020) it is stated that inquiry learning has an influence on being able to improve students' critical thinking skills because the method enhances students' interpretation, analysis, evaluation, inference, explanation, and self-regulation skills which are the core critical thinking skills.Similarly, Lee (2014) stated that inquiry-based learning is an analogy for communicative approach. The principles of inquiry-based learning are compatible with Communicative Language Teaching because communicative approach focuses on communicative proficiency rather than mere mastery of structure to develop learners' communicative competence as to inquiry-based learning.

Similar studies conducted by (Ash and Kluger-Bell, 2012); Byker, Harden, Heafner, and Holzberg (2017); Ahmad et al. (2014) discovered that learners preferred

and performed much better with confirmation level of inquiry compared to guided, structured and open inquiry because teachers provide every needed conditions and allow the student the freedom to learn independently in the confirmation level.

Therefore, the inquiry learning model is how teachers teach which can increase student learning independence in schools. Inquiry learning strategies are a series of learning activities that emphasize the process of thinking critically and analytically to find and determine for yourself the answer to a problem in question.The inquiry learner model positions students for their knowledge to be broader and their thinking power more mature. Inquiry learning places the student as a learning subject so that the student plays a role in determining for himself the essence of the subject matter itself. The teacher acts as a guide and acts to bring about change, facilitator, motivator for his students (Sugianto, 2020). Furthermore, the relationship with the title that will be observed is expected to have an influence obtained based on the methods, research instruments, stages and limitations of research carried out on the inquiry learning model on students' critical thinking ability in the material of the class XI science regulatory system.

▪ METHOD

Participant

This research was conducted at MA Al-washliyah Kedaisianam with accreditation "B" so that it is worthy of being used as a location in research. The research samples used were students as many as 2 classes XI MIA-1 as experimental classes and XI MIA-2 as control classes with a total of 66 students.

Research design and procedures

This study used a quasi-experimental method using a non-equivalent control group approach. The design of this study used the design of the non-equivalent pretest control group design.

Research instruments

The research instrument used was a non-test in the form of a posttest, which was in the form of a questionnaire questionnaire of 19 questions. Then the questioning is validated. The question reference is based on 4 indicators, namely providing simple explanations, building basic skills, summing up the material and strategizing and techniques.

Analysis Data

Data analysis techniques are carried out with normality tests, homogeneity tests and hypothesis tests. In the normality test applying the Kolmogorov-Smirnov test, for homogeneity test apply the Levene statistical test and for hypothesis test using independent sample t-test to see the influence between the control class and the model class and to review the influence on students who think critically on learners

▪ RESULT AND DISSCUSSION

The inquiry learning model is used as a solution because this model is a series of learning that emphasizes the process of thinking critically and analytically to find and find for yourself the answer to a problem in question. The inquiry learning model is a

good choice for a teacher as the results of the research that has been obtained state that the learning model has an influence on improving students' critical thinking ability on the learning material of the regulatory system. The results of the statement are described in descriptive statistical analysis, inferential analysis, and questionnaire data analysis on student learning outcomes as follows.

Descriptive analysis

Based on the results of research conducted in classes XIMIA-1 & XI MIA-2 at MA Al-washliyah Kedaisianam (School Year 2022/2023) on the application of inquiry learning models in improving students' critical thinking skills in the learning material of the regulatory system, the results as stated in the following table.

Table 1. Data on students' critical thinking outcomes

Statistic	Pretest Class Experiment	Pretest Class Control
Mean	66.96	47.48
Standard Deviation	3.557	4.297
Variance	12.655	18.445
Maximum Value	74	56
Minimum Value	59	39

Based on table 1 above, it can be seen that the difference in the average value of the control class and experimental class is 66.96 for the experimental class and 47.48 for the control class. From the comparison of the average values of the two groups, it can be stated that there is a significant difference between the two applied learning models (conventional and inquiry). The experimental class as a class that accepts inquiry learning model actions has a higher average value when compared to control classes that only accept conventional learning model actions. This can also be seen from the difference in the acquisition of the maximum value and the minimum value of the two groups. Students in the experimental class obtained a maximum score of 74 point and a minimum score of 59 point while students in the control class obtained a maximum score of 56 point and a minimum score of 39 point. There is a clear difference between the two groups where the experimental class group is superior to the control class group.

The significant differences between the two groups provide a proof that the inquiry learning model expands students' opportunities to practice problem solving and critical thinking. In other words, this inquiry learning model requires students to be active in learning. Therefore, the inquiry learning model can be said to be one of the learning models that can increase student motivation to always be active in learning activities. Then, to see a comparison of student learning outcomes that are more accurate, among the two groups (experimentation and control) can be presented in the following diagram.

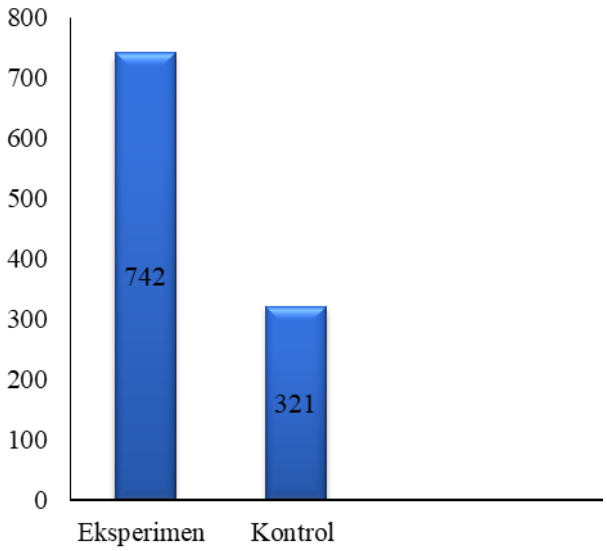

Diagram 1. Data on the results of the comparison of the control class and the experimental class.

The diagram above shows a detailed difference between the acquisition of learning outcomes of experimental class students and the control class. This is presented in the percentage of learning outcomes of each student which shows that the assessment class with the result of adding grades, namely 742, is superior when compared to the control class with the result of adding grades, namely 321 point.

Statistical Analysis of Inferential Learning Outcomes

The results of inferential statistical analysis are presented for hypothesis testing which in this case is a t-test with a signification level of $\alpha = 0.05$. The conditions that must be met for hypothesis testing are that the data obtained are normally distributed and have homogeneous variances. Therefore, a normality test and a homogeneity test are carried out.

Normality Test

The normality test is carried out to find out whether the data that is the research sample is normally distributed data or not. The data can be said to be normally distributed if the value or signification level is greater than 0.05. Based on the calculation results from SPSS V.24 obtained the signification value in the Saphiro Wilk ($N<50$) category, which is 0.742 for the experimental class and 0.322 for the control class. Where, the signification value of $0.742 > 0.05$ and $0.322 > 0.05$, then both data come from the experiment class and the control class can be said to be normally distributed.

Homogeneity Test

Homogeneity tests are performed to find out whether some variants of the data population are categorized as the same or not. This can be seen from the acquisition of a

signification value greater than 0.05. Based on the calculation results of SPSS V.24, the signification value of the homogeneity test for both classes (control and experiment) was seen based on the average value (Based on Mean) which was 0.470. Where, 0.470 > 0.05 which states that both groups come from data whose variants are the same or homogeneous.

Independent Sample t-Test

The Independent Sample t-Test is used to test research hypotheses. Based on the calculation results of SPSS V.24 obtained the value of tthitung = 20.072 and for the value of df 64 then the value of ttabel = 1.669. So it can be seen that thitung>ttabelyang states that there are significant differences between the experimental group and the control group and this has an influence on the application of the inquiry learning model on the ability of MA Al-washliyah Kedaisianam students' abilities which can improve students' critical thinking skills in the learning material of the regulatory system. In addition, the acquisition of the value of Sig. (2-tailed) can also be considered for the hypothesis proposed. The value of Sig. (2-tailed) is 0.000 less (<) than 0.05 which states that H0 is rejected and Ha is accepted. Therefore, the application of the inquiry learning model has a good influence on improving students' thinking ability in the learning material of the regulatory system.

Questionnaire Data Analysis

This analysis aims to determine students' responses to learning using an inquiry learning model revealed with a questionnaire sheet. The questionnaires are prepared in accordance with students' critical thinking indicators consisting of 4 types of learning activities, namely (1) Providing simple explanations, (2) Building basic skills, (3) Concluding material, and (4) Developing strategies and tactics. Based on the results of the percentage of respondents obtained, students can give a positive response to the achievements they receive when the inquiry learning model is applied. This can be seen from the percentage of students with SS (Strongly Agreed) responses on a scale of 72% when compared to the percentage of students with STS (Strongly Disagree) responses which are only on a scale of 13%.

In the application of the inquiry learning model, students are able to ask several questions related to the learning material of the regulatory system. As has been observed, several questions can be asked that can be conveyed by some students such as, "How can the tongue be composed so that it becomes a taste buds?", "What is the function of the regulatory system itself?", and so on. Thus, these questions become the subject of discussion among friends and even teachers which can certainly give birth to arguments that encourage students' ability to think critically.

Overall the inquiry learning model is a way of teaching that emphasizes the teaching experience and encourages students to discover their own concepts and principles. Based on the results of the research obtained, it can be said that the inquiry learning model has a good influence on improving students' thinking ability, especially in the learning material of the regulatory system. This is in line with previous research conducted by Desy Nugrahani (2016) as the results of the research he obtained stated that there was a significant influence on improving students' critical thinking skills when applying inquiry learning models.

In addition, Mardaleni (2019) has also conducted research on the application of inquiry learning models as the results she obtained stated that the guided inquiry learning model has a significant effect in helping the student learning process more effectively and efficiently. This is also in line with the findings in the research of class XI MIA-1 & XI MIA-2 students at MA Al-washliyah Kedaisianam. This learning model assists students in using existing memories to be associated with the concept of regulatory system learning, encourages students to think and work on their own initiative, gives students the opportunity to be active in putting forward arguments they understand about the regulatory system, as well as helping students to solve the problems they encounter in understanding the material of the regulatory system. Therefore, judging from the many advantages that exist in the inquiry learning model, this learning model can be used as an alternative to solving problems that occur in MA Al-washliyah Kedaisianam. This inquiry learning model is expected to be able to solve problems of teacher performance, student activities and learning outcomes in the regulatory system material.

▪ CONCLUSION

The application of the inquiry method has a positive influence on improving students' critical thinking skills, especially at MA Al-washliyah Kedaisianam. This can be seen from the results of hypothesis tests based on the calculation of SPSS V.24 obtained values thitung = 20,072 and for the value of df 64 obtained the value ttabel = 1,669 which states that thitung > ttabel so that significant differences were found between the experimental group and the control group. Not only that, the acquisition of the Sig. (2-tailed) value can also be a proof of the effective application of the inquiry learning model to the learning material of the regulatory system. The Sig. (2-tailed) value obtained is worth 0.000 less (<) than 0.05 which proves that H0 (the absence of the influence of the application of the inquiry learning model in improving students' critical thinking ability on the regulatory system learning material) is rejected and Ha (the influence of the application of the inquiry learning model in improving students' critical thinking ability on the regulatory system learning material) is accepted.

Therefore, the application of the inquiry learning model can be a reference for teachers in improving students' critical thinking skills, especially in regulatory system learning materials. However, due to the limited time in the research, to improve the application of a more effective and efficient inquiry learning model, several suggestions are needed, such as the implementation of the inquiry method requires timing so that all activities are distributed. In terms of providing an understanding of the material, it can run well and the teacher is expected to be able to better prepare himself to condition students to make it easier to follow the inquiry learning model as well as motivate students to be independent in finding and reading learning resources that are provisions for themselves in participating in learning activities well.

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