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Relationship between Students' Metacognitive Skills and Critical Thinking Skills in Learning History Through The Application of Inquiry Based Learning

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Abstract: *This research aims to determine the relationship between metacognitive skills and critical thinking skills of students in learning history through the application of inquiry based learning. This research is quantitative research using a survey method with a correlational research design. The population in this study were class XI students at SMAN Jenggawah and 1 class was taken as a sample (XI-2) which was selected using the cluster random sampling technique. The relationship between metacognitive skills and critical thinking skills is measured by looking at the correlation coefficient of 0.621 which is classified as strong and the linear regression equation of* $\hat{Y} = 23.172 + 0.844X$ *which is obtained from the analysis results. The results of this research show that there is a relationship between metacognitive skills and critical thinking skills in history learning through the application of the inquiry based learning model, namely linear, positive and significant.*

Keywords: ***Metacognitive Skills, Critical Thinking Skills, Inquiry Based Learning Model***

1. INTRODUCTION

The rapid development of science and technology today requires humans to increase their knowledge and experience so that it can bring major changes in learning and learning. In education, this change is known as the Internet of Things, Internet of Everything or Industrial Internet (Bonekamp & Sure, 2015; Ghani & Muhammad, 2019; Karatas & Zeybek, 2020; Kurt, 2019). The use of technology in education is important (Tarbutton, 2018). It is important to use the latest technology to help expand learning content and improve learners' learning efficiency (Hew et al., 2018; Tawfik et al., 2018). Thus, the development of technology in learning is imperative.

The process of scientific development can be seen from the industrial revolution 4.0 which can be seen from various fundamental changes. The changes in question include changes in basic technology, social, macroeconomics, and so on. The characteristics of the industrial revolution 4.0 are artificial intelligence, iCloud data, internet of people, big data, internets of things (IoT) and digitalization where all these new developments have caused disruption in various fields of human life, including one that has a considerable impact on the education sector (Afrianto, 2018). The industrial revolution 4.0 is governed by artificial intelligence and digital physical frameworks that make human-machine relationships more common (Shahroom & Hussin, 2018). Lack of digital culture, training, knowledge, and language are also (Hariharasudan & Kot, 2018) challenges faced by industry 4.0 on 21st century skills. Where learners must have 4C skills which have components including: (1) critical thinking and problem solving, (2) creativity, (3) collaboration, and (4) communication (Cevik, 2019; Sipayung et al., 2018; Sumardi et al., 2020; Umamah et al., 2021; Wetchasit et al., 2020). Thus, educational institutions are required to create a quality learning system to improve students' 4Cs skills.

Based on previous research, history lessons themselves are considered boring, uninteresting, and difficult and only rely on memorization. Learners who are quiet and rarely ask questions are more likely to experience learning difficulties and not understand the material presented by the teacher (Wahyuni., et al 2022). Learners are not given the right stimulus to solve problems by utilizing higher levels of thinking, so that the level of thinking of students is generally very ordinary. As a result, learning achievement is still below the maximum completeness criteria desired by a teacher (Bororing et al, 2002; Rengkuan., et al 2018, 2023). This fact occurs in one school and many high schools in Indonesia, especially in history learning. As a result, it can be concluded that (Corebima, 2016 in Rengkuan., et al 2023; Bilik et al., 2020) history learning in general is still lacking in empowering higher order thinking skills, including metacognitive skills and critical thinking skills.

Therefore, further research is needed to further investigate the relationship between metacognitive skills and students' critical thinking skills in the context of history learning. The purpose of this study is to confirm the relationship between metacognitive skills and students' critical thinking skills in history learning through the application of inquiry-based learning.

2. LITERATUR REVIEW

2.1 Metacognitive Skill

The term 'meta-cognition' refers to an individual's awareness of and ability to think critically, i.e. to think about the learner's own thinking, using reflective judgment, consideration and control over his or her own cognitive processes and strategies. The concept of 'meta-cognition' was introduced to assist gifted and disabled learners in the development of memory and reflective thinking, especially in the areas of literacy and problem solving (Tachie. S. A., 2019). Moore & Dwyer (2001) stated that metacognition is an awareness of the process of thinking about what is known and what will be done. Choi (2005) explains metacognition is knowledge about mental processes and controlling these processes to achieve goals. Therefore, (Darmawan. E. et al., 2020) metacognition is used to organize and control the thinking process carried out by students in solving a problem through verification. Thus, the goal of solving a problem can be achieved effectively and efficiently.

Metacognitive skills have become an important part of 21st century education (Zohar, A., & Barzilai, 2013; Miharja, Hindun & Fauzi; 2019). The application of metacognitive learning activities will be meaningful and able to involve students' activeness in learning science, moreover it can build the independence of learners who are able to ask questions well, find answers to the questions asked and find answers independently (Nielsen, 2019); Darmawan et al., 2018). Metacognitive skills refer to the activities of controlling, monitoring, and self-regulation that occur when learning and solving a problem, as expressed by Bannert & Mangelcamp (2008). Metacognitive skills concern procedural knowledge related to actual rules, and control over cognitive processes and one's learning activities (Asy'ari & Ikhsan, 2019). Learners who have metacognitive skills will be able to understand their academic strengths and weaknesses. Then, from their background knowledge, learners can adjust their needs to meet the demands of certain tasks (Lestari, Ristanto & Miarsyah, 2019; Permana & Chamisijatin, 2019). Based on their knowledge and skills, learners can manage their involvement in tasks in an effort to optimize the learning process and outcomes. For example, when learners encounter obstacles in their work, learners will rethink and revise based on task goals.

2.2 Critical Thinking Skill

Critical thinking skills are high-level thinking skills that must be taught to students starting from basic education to higher education (Karakoc, 2016; Nizaruddin & Kusmaryono. I., 2023; Akapo, 2021). Critical thinking skills are a process for making reasonable decisions, so that what we consider the best of a truth we can do correctly (Changwong et al., 2018; Ghazivakili et al., 2014; Karakoc, 2016; Raj et al., 2022). Critical thinking involves the ability to correctly analyze every action to be taken. When we use critical thinking skills (Indrasieny et al., 2021; Penkauskieny et al., 2019) we will analyze a problem well, so that the solution taken is a solution that is believed to be correct and minimizes errors.

According to Johnson (2002), critical thinking can be used as a means to solve problems, make decisions, seek answers, enrich meaning, and fulfill the desire to know something. Critical thinking skills can help people to make informed decisions based on careful, systematic, logical efforts and consider many points of view. Someone who is able to think critically will be able to study complex ideas systematically to understand the difficulties that occur or their consequences in the future, thus enabling learners to make the right decisions. Elder identifies five characteristics of someone who has critical thinking skills: a) can ask important questions and problems and formulate them clearly and precisely; b) can collect and evaluate relevant information and use abstract ideas to interpret it effectively; c) can conclude and provide good solutions, and test them based on relevant criteria and standards; d) have an open mind to other thoughts, recognitions, and values; and e) can communicate effectively (Pentury. J. W. et al., 2023).

2.3 Inquiry Based Learning

Inquiry-based learning is one of the main strategies used in the learner-centered approach. It is a perfect way to lock learners in as a more significant way to learn than transmission of actuality, learning by doing experience (Dewey, 1933; Smith, 2006; Joseph. V. et al., 2022). It involves the observation of facts to interpret challenging real-world problems (Ma, Xiao, Wei & Yang, 2011). Kember (1997 as cited in Smith, 2006) states that inquiry-based learning sets the foundation for a learner-centered approach, which becomes focused on learner learning rather than sharing a collection of well-defined knowledge content or subject matter. IBL creates an active learning environment as it involves learning through discussion, questioning and problem solving (Ruler & Felder, 2006; Khalaf & Zin, 2018). IBL is one of the inductive method approaches that facilitates the improvement of learners' self-learning skills and also applies collaborative or cooperative learning that encourages learners' critical thinking.

This model requires learners to question the truth and accuracy of the information obtained. The importance of this method requires students to understand what they have learned (Parasuraman, B. et al., 2020). The inquiry model also emphasizes reflective inquiry and interesting findings in the teaching and learning process. What is emphasized in this model is that students no longer just accept what the teacher gives, but rather guide students to learn the right information. This model is important for learners to make decisions or find answers related to themselves (Tamim & Grant, 2013; Maxwell, Lambeth, & Cox, 2015). In finding answers to problems, learners need to use their thinking skills to find relevant evidence to conclude. Council (2000) states that there are three main reasons that drive the need to implement inquiry-based learning in the classroom. First, it can change and improve learners' behavior and skills about practical understanding. Second, learners require greater involvement in

reading, writing and participating in critical discussions as they learn. Finally, it encourages learners to participate in critical arguments, represented by learners' explanations of observed phenomena and supported by logical reasoning (Khalaf, B. K. & Zin, Z. B. M., 2018).

3. METHOD

3.1 Research Design

The research was conducted at SMA Negeri Jenggawah, Jember Regency in the even semester of the 2023/2024 academic year. The population in this study were all students in grade XI of SMA Negeri Jenggawah in the school year 2023/2024 even semester which amounted to 288 students and consisted of 8 classes. The sampling technique in this study was carried out using the Cluster Random Sampling technique. However, before being randomized, the class was tested for homogeneity through the value of the last daily test conducted by grade XI students in history subjects.

This research design is a correlational research design. In this design, researchers use survey methods. This correlation research is used to determine the relationship between metacognitive skills and critical thinking skills of students, where the correlation research design used is the prediction design by Fraenkel (2009).

Table 1: Predictive correlation research design (Fraenkel, 2009)

Subjek	Observasi	
	O_1 (X)	O_2 (Y)
A	-	-
B	-	-
Dst.	-	-

Description:
O_1 (X) : X variable is measured first
O_2 (Y) : Y variable measured at the end
A, B, dst: Research Subject

3.2 Data Collection and Research Instruments

Data collection in this study used questionnaire techniques, test techniques and documentation. The questionnaire technique in this study was designed in the form of statements in accordance with the indicators of metacognitive skills. The statements in the questionnaire are presented in two forms, namely favorable (positive statements) and unfavorable (negative statements). For the test technique given to students in this study is intended to measure the level of critical thinking of class XI students in learning history. while for the documentation technique in this study has the aim of obtaining data from history learning activities in class XI SMA Negeri Jenggawah.

Research instruments are tools or facilities used by researchers in collecting data so that their work is easier and the results are better, in the sense that they are more careful, complete and systematic so that they are easier to process. The number of instruments is adjusted to the number of variables and developed based on indicators of research variables (Sugiono, 2013). The form of instruments in this study was a metacognitive skill questionnaire and a critical thinking skill test. The metacognitive skill questionnaire instrument and critical thinking skill test were tested for validity and reliability so that they had a level of difficulty that was suitable for testing.

3.3 Data Analysis Methods

The data analysis method used SPSS 25 for Windows. In the data analysis, a normality test and a linearity test were carried out first as a prerequisite test for analysis. The normality test is used to determine whether the data obtained during the study is normally distributed or not. The calculation of the normality test uses the Kolmogorov-Smirnov technique in SPSS 25 for Windows with a significance level of more than 0.05 (> 0.05) then it is normally distributed. If the significance value is less than 0.05 (<0.05) then it is not normally distributed. While the linearity test is used to determine whether there is a linear relationship between metacognitive skills and critical thinking skills with a significance level of more than 0.05 (sig.> 0.05) then it is said to be linear, and if the significance is less than 0.05 (sig. <0.05) then it is said to be non-linear. Then for the hypothesis test in this study, regression and correlation analysis were used to determine the relationship between one variable and another variable. Regression and correlation analysis in this study were carried out using SPSS 25 for Windows software.

4. FINDINGS

The following are the results of the prerequisite test which includes normality test and linearity test, then continued with hypothesis testing using regression analysis and simple correlation analysis:

Table 2: X and Y Variable Data Normality Test Results

Data	Kolmogorov-Smirnov			Keterangan
	Statistic	Df	Sig.	
Metacognitive Skill (X)	0,140	36	0,074	Normal
Critical Thinking Skill (Y)	0,122	36	0,199	Normal

(Source: processed primary data)

Table 2 shows the significance value of the results of the normality test of metacognitive skills and critical thinking skills using the Kolmogorov-Smirnov technique of 0.074 (metacognitive skills) and 0.199 (critical thinking skills). Based on the decision-making criteria that the significance value is more than 0.05, the data is said to be normally distributed. The results of the metacognitive skill and critical thinking skill normality test can be seen in the appendix.

Table 3: Linearity Test Results X and Y Variables

Variabel	Sum of Squares	df	Mean Square	F	Sig.

Critical Thinking Skill * Metacognitive Skill	662,653	11	60,241	2,990	0,765

(Source: processed primary data)

Based on the data presented in table 3, it shows that metacognitive skills and critical thinking skills have a significance value greater than 0.05, namely 0.765, it can be concluded that between the variables of metacognitive skills and critical thinking skills of students there is a significant linear relationship.

Test Hypothesis

Hypothesis testing in this study was carried out using regression and correlation analysis. Regression and correlation analysis carried out in this study includes simple linear regression analysis and simple correlation analysis. The decision making in this test, namely:

a. If the significant value is smaller than 0.05 (sig.<0.05), then accept H0 which means regression means

b. If the significant value is greater than 0.05 (sig.>0.05), then reject H0 which means the regression does not mean

Table 4: X and Y Variable Coefficient Results

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error	Beta		
(Constant)	23,172	13,942		1,662	,106
Metacognitive Skill	,844	,183	,621	4,620	,000

a. Dependent Variable: Critical Thinking Skill

Based on the results of the simple linear regression test on the relationship between metacognitive skills (X) and critical thinking skills (Y) on historical material in the appendix, the value (ryx1)2 is 0.386 and obtained Fcount (21.347) > Ftable (4.11) with numerator df = 1 and denominator df = 36, and sig value. 0,000 < 0,05. This shows that the regression is significant or meaningful. The constant value a = 23.172 and the coefficient b = 0.844 are obtained.

Table 5: Simple Correlation Analysis

		Metacognitive Skill	Critical Thinking Skill
Metacognitive Skill	Pearson Correlation	1	,621**
	Sig. (2-tailed)		,000
	N	36	36
Critical Thinking Skill	Pearson Correlation	,621**	1
	Sig. (2-tailed)	,000	
	N	36	36

**. Correlation is significant at the 0.01 level (2-tailed).

The results of a simple correlation test conducted to determine the relationship between metacognitive skills (X) and critical thinking skills (Y) obtained rcount of 0.621 rtabel 0.329 and sig value. 0,00 < 0,05. Thus, H0 is accepted which states that there is a positive relationship between metacognitive skill (X) and critical thinking skill (Y). Based on the interpretation table, it is known that the rcount obtained is 0.621, which states that the correlation between metacognitive skills (X) and critical thinking skills (Y) is classified as strong.

5. DISCUSSION

The results of the study prove that there is a positive and significant relationship between metacognitive skills and critical thinking skills of students in learning history through the application of inquiry-based learning models. This statement is generated from hypothesis testing assisted by SPSS 25 for windows software using simple correlation analysis and simple linear regression analysis to obtain a regression equation of $\hat{Y} = a + bX$ ($\hat{Y} = 23.172 + 0.844X$) which means that if b is positive, then there is a positive relationship between the independent variable (X) and the dependent variable (Y), meaning that when variable X increases, variable Y tends to increase. But if b is negative, then there is a negative relationship between the independent variable (X) and the dependent variable (Y), meaning that when variable X increases, variable Y tends to decrease. The function of this regression equation is used to predict the value of students' critical thinking skills (Y) based on the value of students' metacognitive skills (X) during learning.

Measurement of metacognitive skills is done by giving a metacognitive skill questionnaire to the sample, then measuring the critical thinking skills of students on historical material after the history learning process is completed. The data obtained was then analyzed to determine the relationship between the variables. Based on the research data, it can be seen that most of the students of class XI-2 SMA Negeri Jenggawah have metacognitive skills classified as "moderate" and critical thinking skills classified as "excellent". This means that the value of students' critical thinking skills is determined by the metacognitive skill factor possessed by these students, the higher the metacognitive skill, the higher the students' critical thinking skills.

These results are in accordance with the results of Milama's research. B., Damayanti, N.A. & Murniati. D (2017) which states that there is a relationship between metacognitive skills and student learning achievement. In addition, the results of this study are in line with several other research results,

including the results of research from Wahyudienie. M.B (2018) which states that there is a positive and significant relationship between metacognition and students' process skills, and the results of Bourdeaud'hui's research. H., et al (2021) showed a relationship between metacognitive awareness and students' critical listening skills. The same thing was also conveyed by the learners. B. H., et al (2020) stated that there is a positive relationship between critical thinking skills and metacognitive skills with student learning outcomes.

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7. REFERENCES

[1] Amin, A. M., Corebima, A. D., Zubaidah, S., & Mahanal, S. (2020). The Correlation between Metacognitive Skills and Critical Thinking Skills at the Implementation of Four Different Learning Strategies in Animal Physiology Lectures. *European Journal of Educational Research.* https://doi.org/10.12973/eu-jer.9.1.143

[2] Bae, H., & Kwon, K. (2021). Developing metacognitive skills through class activities: what makes students use metacognitive skills?. Educational Studies, 47(4), 456-471.

[3] Berie, Z. Damtie, D. and Bogale, Y. N. (2022). Inquiry-Based Learning in Science Education: A Content Analysis of Research Papers in Ethiopia (2010–2021). *Education Research International.*10. https://doi.org/10.1155/2022/6329643

[4] Creswell, J. W., & Creswell, J. D. (2017). Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications.

[5] Darmawan, E., et al (2020). Simas Eric Learning Model (SELM): Enhance Student' Metacognitive Skill Based on the Academic Level. *International Journal of Instruction*, 13(4), 623-642. https://doi.org/10.29333/iji.2020.13439a

[6] Deak, C. et al. (2021). Evolution of New Approaches in Pedagogy and STEM with Inquiry-Based Learning and Post-Pandemic Scenarios. *Education Sciences*. 11. 319. https://doi.org/10.3390/educsci11070319

[7] Eggen, P. D., & Kauchak. (1990). Strategies for teachers. Boston, Massachussets, MA: Allyn and Bacon.

[8] Flavell, J. H. (1976). Meta-cognition and cognitive monitoring: a new area of cognitive-development inquiry. American Psychologist, 34(10), 906–911. https://doi.org/10.1037/0003-066X.34.10.906

[9] Güner, P. & Erbay, H. N. (2021). Metacognitive skills and problem-solving. International Journal of Research in Education and Science (IJRES), 7(3), 715-734. https://doi.org/10.46328/ijres.1594

[10] Hastuti, I. D., Surahmat, S., Sutarto, S., & Dafik, D. (2020). The effect of guided inquiry learning in improving metacognitive skill of elementary school students. International Journal of Instruction, 13(4), 315–330. https://doi.org/10.29333/iji.2020.13420a

[11] Inya, M. N. Corebima, A. D. Rohman, F. (2016). The correlation between metacognitive skills and the critical thinking skills of the senior high school students in biology learning through the implementation of problem based learning (PBL) in Malang, Indonesia. *International Journal of Academic Research and Development*. https://www.newresearchjournal.com/academic

[12] Kim, K.S., & Choi, J.H. (2014). The relationship between problem solving ability, professional self concept, and critical thinking disposition of nursing students. International Journal of Bio-Science and Bio-Technology, 6(5), 131-142. https://doi.org/10.14257/ijbsbt.2014.6.5.13

[13] Kozikoglu, I. (2019). Investigating critical thinking in prospective teachers: metacognitive skills, problem solving skills and academic self and academic self-efficacy. Journal of Social Studies Education Research, 10(2), 111-130.

[14] Naimnule, L. & Corebima, A. D. (2018). The Correlation between Metacognitive Skills and Critical Thinking Skills toward Students' Process Skills in Biology Learning**.** *Journal of Pedagogical Research*

[15] Nunaki, J. H. Damopoli, I. Nusantari, E. & Kandowangko, N. Y. (2019). The contribution of metacognitive in the inquiry-based learning to students' thinking skill based on SOLO Taxonomy. *Journal of Physics: Conference Series*

[16] Rengkuan, M., Leasa, M. & Sumampouw, H. M. (2023). Metacognitive And Critical Thinking Skills Of Genetics Of Biology Students With Project-Based Learning. Cypriot Journal of Educational Sciences. 18(2): 522-532. https://doi.org/10.18844/cjes.v18i2.7299

[17] Simurat, L. et al. (2021). Inquiries-Based Learning Workshop One of Teacher Development to Improve the Quality of Learning in Santa Lusia Sei Rattan Private Junior High School. *Advances in Social Science, Education and Humanities Research.* 591

[18] Syahmani, Almubarak & Azizah, N. A., (2023). Improving Students Metacognitive Skill and Learning Outcomes Through The Application of Task-Based Learning Model of Direct Instruction. *Vidya Karya.* 38(1). 1-13. https://doi.org/10.20527/jvk.v37i1.13649

[19] Tachie, S. A., (2019). Meta-cognitive Skills and Strategies Application: How this Helps Learners in Mathematics Problem-solving. Journal of Mathematics. *Science and Technology Education.* 15(5). 1-12. https://doi.org/10.29333/ejmste/105364

[20] Umamah, N., et al. (2021). The Impact of Technology on Learning. Journal of Educational Impact.

[21] Wale, B. D., & Bishaw, K. S. (2020). Effects Of Using Inquiry-Based Learning On EFL Students' Critical Thinking Skills. Asian-Pacific Journal of Second and Foreign Language Education. 5(9): https://doi.org/10.1186/s40862-020-00090-2

[22] Zulfiani., et al (2020). Comparing Metacognitive Skill between Problem-based Learning Combine Question Student Have and Problem-based Learning Combine Learning Journal. *Science and Technology Publications*. 2892-2899. DOI: 10.5220/0009915028922899