

THE EFFECT OF USING *GPT CHAT ARTIFICIAL INTELLIGENCES (AI)* ON STUDENTS' HIGHER-ORDER THINKING SKILLS

Mariati^{1*}

¹Faculty of Teacher Training and Education, Universitas Muhammadiyah Sumatera Utara

¹*email:* mariati@umsu.ac.id

Abstract: Information and communication technology has evolved dramatically especially in recent decades, not least technology that affects learning in the world of education including in higher education. One of the technological innovations that appear and develop today is the use of artificial intelligence (AI) in the form of openAI chatbots, namely Chat GPT. The use of Chat GPT in the learning process raises pros and cons in learning because it has a complex impact. One of the impacts caused is the decline in the level of critical thinking skills and problem-solving abilities of students as one part of higher-order thinking skills in 21st century learning, namely critical thinking and problem solving. The purpose of this study was to determine the impact of using Chat GPT on the critical thinking skills of students, especially accounting education students at the Faculty of Teacher Training and Education, University of Muhammadiyah North Sumatra (FKIP-UMSU). The type of research used is qualitative research with an ethnographic approach. The population in this study was students of the accounting education study program in the third, fifth and seventh semesters with a sample of 30 students. Data collection techniques in this study used questionnaires, interviews and observations. The results showed that there was an influence of Chat GPT on students' critical thinking skills as an indicator of higher-order thinking skills.

Keywords: Artificial Intelligences, Chat GPT, Higher Order Thinking Skills

Introduction

The development of technology and information has developed dramatically and significantly in recent decades, Technology is no exception that affects learning in the world of education, including in higher education. One The technological innovation that is emerging and developing today is the use of *artificial intelligences (AI)* in the form of *chatbot* Release *openAI* that is *Chat Generative Pre-trained Transformer* (better known, and hereinafter referred to, as *Chat GPT*) (Cotton et al., 2023). *Chatbot* itself is an artificial intelligence program integrated with AI technology (*artificial intelligence*) is able to respond to user questions in a similar way to human interaction, but in the form of automated text and has created tremendous speculation among stakeholders in academia, not the least of whom are researchers and teaching staff. *Artificial Intelligence (AI)* is changing many aspects of modern society, including education. In higher education, AI has the potential to revolutionize teaching and learning, making education more personalized, efficient, and accessible (Yeboah & Nyagorme, 2022). *Chat GPT* by *OpenAI* is an example of a generative language model that can produce human-like responses to open requests, such as questions, statements, or requests related to academic material (Maphosa & Maphosa, 2023).

Technology adoption *Chat GPT* began to enter Indonesia and developed rapidly, especially in the scope of education, especially in the world of lectures. *Chat GPT* itself was launched in late November 2022 by open AI with the service initially launched for free (Maula et al., 2024) and provide opportunities for utilization *chatbot* AI in the world of education in Indonesia, especially in the development of students' higher-order thinking skills that are relevant to one of the demands of the 21st century, namely *critical thinking and problem solving*. Through these technological advances, learning resources are not only limited to educator-controlled approaches, but also involve the use of tools that can accelerate access to a wider range of learning resources (*broad-based learning*). In this context, technology becomes a scientific discipline that is an essential need for educators and students in facing the challenges of 21st century learning. The presence of technology *Chat GPT* At this time it is enough to help students in solving problems or assignments in lectures, but with the presence of this technology it is feared that it can damage the mindset and enthusiasm for student learning because with the advancement of technology this greatly facilitates work without forcing them to think heavily.

When analyzed, the advantage of *Chat GPT* lies in its ability to respond to users with words or sentences that have been entered quickly. In addition, Chat GPT also has several disadvantages, one of which is that the answers produced are not always accurate, such as a lack of deep understanding of context when producing the information needed. *Chat GPT* can be categorized as high-tech plagiarism. In addition, students who mostly use *Chat GPT* have the potential to experience a decrease in critical thinking power and lose the ability to solve a problem because they tend to be lazy and less trying to do their tasks. Actually, if students are smart to utilize and use AI technology properly and correctly, there will be many advantages from *Chat GPT* which is one of the *Artificial Intelligence* (AI) technologies. But on the contrary, if students or users are too dependent it will be self-defeating, many potentials that exist in users slowly disappear because the use of this technology will make an individual lazy and not independent. Therefore, the use of *Artificial Intelligence* (AI) technology or *Chat GPT* itself requires appropriate and not excessive understanding and application.

This study focuses on the use of *Chat GPT* on the level of high-level thinking skills of accounting education students of FKIP Universitas Muhammadiyah North Sumatra, especially in critical thinking and problem solving skills related to accounting education course assignments.

Artificial Intelligence (AI)

Artificial Intelligence (AI) is one of the branches of science that allows machines, such as computers, to carry out tasks and functions as can be carried out by humans. More specifically, AI involves efforts to develop intelligence on machines based on human-like behavior (Education, 2023). The ultimate goal of AI is to allow computers to execute commands with capabilities that can rival those of humans. Broadly speaking, AI can be divided into four categories, namely: (Cholissodin & Soebroto, 2021):

1. *Thinking humanly* : This approach is done in two ways: first through introspection, trying to capture our own thoughts as we think. "*How do you know that you understand?*". The second is through research in terms of psychology. In conclusion, this AI system has the ability to think and process information as humans think
2. *Acting humanly*: In the 1950s, Alan Turing designed a test for intelligent computers (intelligent bots) to test whether they were capable of tricking a human/*interrogator* through remote text-based communication. Of course, the computer must have the ability,

- Natural Language Processing, Knowledge Representation, Automated Reasoning, Machine Learning, Computer Vision, Robotics.* This AI approach is able to perform tasks or interactions with the environment as humans do.
3. *Think rationally* : AI systems can perform logical and rational thinking in decision making. In this approach there are two problems, namely first it is not easy to make informal knowledge, then express it in *formal terms* with logical notations. Secondly, there is a big difference between being able to solve problems "in principle" and solving them "in the real world".
 4. *Act rationally* : AI systems are able to act and respond to situations in a rational manner, based on predetermined logic and goals. This approach creates logical inferences that are part of a *rational agent*. Because to do action rationally is to reason logically, it can be concluded that the action taken will achieve the goal or not

Artificial intelligence (AI) is currently one of the most amazing technologies in all countries in the world, including Indonesia (Erizal et al., 2024). AI seeks to create machines that can mimic or even surpass human cognitive abilities in various aspects of tasks, thinking, and actions. AI has the ability to execute various tasks that generally require human intelligence, such as speaking, hearing, seeing, learning, thinking, and solving problems (Sihotang, 2015) (Hariani et al., 2020). AI is able to introduce itself to various areas of life as a solution to meet the needs of today's global society. The presence of AI has given birth to various innovations that are increasingly sophisticated and creative, which have a huge impact on all areas of human life, including society, business, economy, and health.

The introduction of AI in various areas of life will have a positive impact because AI can solve various life problems in the current situation. On the other hand, AI is also a threat to human resources because many human jobs are slowly being replaced by AI. In the future, the development of AI will be more sophisticated and innovative breakthroughs will occur one after another, so people need to continue to increase their creativity along with the development of science, especially technology. (Pakpahan et al., 2021).

Chat Generative Pre-trained Transformer (Chat GPT)

Chat Generation Pre-Training Transformer (Chat GPT) is a variant of the artificial intelligence language model (Brown et al., 2020)(Cotton et al., 2023) developed by OpenAI. The model is specifically designed to produce text that is human-like in conversational style, and was introduced in 2021. *Chat GPT* has gained a very significant place in the media and technology industry. *Chat GPT* Known for its ability to perform a variety of language tasks including translation, summarization, answering questions and text creation.

Since its release, *Chat GPT* It has been used for a variety of applications including language translation, content creation and language modeling. *Chat GPT* It has been proven to translate between languages with a high degree of accuracy and produce long, coherent and informative document summaries. *Chat GPT* has also been used to create *chatbot* who can carry on conversations with users and answer questions, which demonstrate the ability to understand and respond to natural language input. *Chat GPT* It has also attracted significant attention and controversy for its ability to produce realistic and coherent text, raising concerns about the potential uses and impact of AI in the field of language processing (In et al., 2023).

Higher Order Thinking Skills of Students

Learning needs are emphasized on understanding concepts using learning models that facilitate critical, creative, and analytical thinking skills (mariati, 2018). Competencies or skills

that must be possessed by students in this 21st century learning are critical thinking and problem-solving skills, communication and collaboration skills, creative thinking abilities or *creative-thinking skills*, information technology and communication literacy skills, contextual learning skills, and information and media literacy skills (Retrieved, 2019). These skills are called higher-order thinking skills. Higher order thinking (*higher order thinking*) is referred to as a combination of critical thinking, creative thinking, and analytical thinking. Critical thinking involves analysis, evaluation, inference, observation, reflection, and reasoning. It is a process that needs to be carried out by a person in making decisions that are more realistic and interrelated with learning or the achievement of learning objectives (Maphosa & Maphosa, 2023).

Critical thinking skills (*Critical Thinking Skills*) is a thinking skill to solve problems or make decisions about problems faced (Saehu, 2017). This skill is absolutely necessary for everyone to be able to solve problems and make decisions on problems faced in real life. In addition, these critical thinking skills include the ability to discern truth or lies, facts or opinions, or fiction and nonfiction.

Critical thinking is the embodiment of higher-order thinking (*higher order thinking*). The ability to think is the highest cognitive competence that students need to master in learning (Retrieved, 2019). Critical thinking can be viewed as the ability of students to compare two or more information, for example information received from outside with information owned. If there are differences or similarities, students will ask questions or comments with the aim of getting an explanation. Incorporating concept mapping into learning activities (e.g., discussion, debate, journaling, etc.) can provide a mechanism for students to build and integrate knowledge at a higher level of learning and enhance the development of students' critical thinking skills.

Many students struggle to understand critical thinking, lack confidence in its application, are unsure how they can develop critical thinking skills, and struggle to demonstrate them in their assessments (Golden, 2023). Therefore, an educator is very important to be aware of the specific needs of his learners when choosing a teaching approach. In addition, although many educators believe critical thinking to be an essential element of education, they often feel unprepared to teach critical thinking.

Critical thinking is one of the suggested ways that one can look at problems from many perspectives. A creative thinker produces more alternatives to solve problems. So, this skill needs to be accustomed to be trained in learning so that it becomes a provision for students to face the future. Critical thinking is a higher-order thinking skill that is able to form students who are able to think neutrally, innovatively, objectively, logically and far ahead. Therefore, good critical thinking will be very beneficial for students in the short term at university or in the long term in the world of work in their future lives. Critical thinking will also help in facing the challenges of the 21st century especially in the era of innovation (Retrieved, 2019).

Method

The method used in this study is a qualitative research method with an ethnographic approach. The ethnographic approach is an approach that focuses on group activities. The groups studied in this study usually consist of more than 2 individuals. Ethnography uses extensive observation and a deep understanding of the group. What researchers observe from group activities is in the form of language, behavior, and interaction carried out by the group when given tasks to be completed independently, and when questions and answers are carried

out about lecture material using high-level questions in the *Higher Order Thinking Skills* category(HOTS). The group studied was students of the Accounting Education Study Program at the Faculty of Teacher Training and Education, University of Muhammadiyah North Sumatra who were studying in semesters three (3), five (5) and seven (7) totaling 30 people. The data collection techniques used were observation and interviews. Observations were made directly for one semester, precisely when researchers taught in these classes. The interview was conducted in two (2) ways, namely directly and indirectly. Direct interviews are conducted by asking several questions related to lecture materials carried out *offline* (outside the network) and *online* (through the zoom application) which are answered directly by students. While indirect interviews were conducted using questionnaires. The purpose of using these different types of interviews is to 1) obtain information about students' higher-order thinking skills, especially in analyzing questions that require critical thinking and evaluating problem-solving questions, 2) to find out how dependent students are on AI (*Artificial Intelligence*) technology in the form of *Chat GPT* in answering any questions given. Before conducting an interview, researchers first prepare questions that will be asked to students. The results of the interview, both direct and indirect, will be converted into research transcripts.

Results and Discussion

The use of AI *Chat GPT* on students' higher-order thinking skills which has been carried out on 30 students as research objects, was carried out using direct and indirect observations and interviews (questionnaires). Observation activities are carried out when researchers carry out lecture activities in class. Observation is used to identify students' thinking skills at a high level of cogitiveness. Researchers observe the ability of students to answer or provide comments related to questions or reasons both asked by students to lecturers and vice versa whose nature of questions leads to high-level question categories which include the ability to analyze (C4), evaluate (C5) and create (C6). The total questions asked through in-person interviews and through questionnaires were 25 questions. The results of the questionnaire distribution can be seen in this table:

Table 1. Results of the research questionnaire

Information	Total	%
Who has used <i>GPT Chat</i>	28	93,3%
Who haven't used <i>GPT Chat</i> yet	2	6,7%

Respondents who gave more answers were women as many as 26 people (86.7%) while men were 4 people (13.3%). Of the 30 respondents, 11 people (36.7%) were students in semester III, 5 people (16.7%) students in semester V and 14 people (46.7%) students in semester VII.

Based on interviews and questionnaires that have been conducted, the results of respondents' answers are divided into 5 categories, namely, 1) the *use of Chat GPT in completing lecture assignments*, 2) *ease of use* of Chat GPT, 3) social influence when using Chat GPT, 4) *perceived security in using Chat GPT* and 5) students' ability to analyze questions that require critical thinking and evaluate problem-solving questions. Based on these 5 results, the following results were obtained;

Table 2. Utilization of *Chat GPT* in completing lecture assignments

Question	Answer
----------	--------

1. Have you used <i>Chat GPT</i> to help you complete each coursework ?	SS	S	KD	TP
	16,7%	20%	56,7%	6,7%
2. Can <i>GPT Chat</i> help you complete academic assignments faster?	SM	M	KD	TP
	16,7%	43,3%	33,3%	6,7%
3. Is <i>Chat GPT</i> useful for you in completing every lecture assignment?	SB	B	KD	TP
	16,7%	50%	26,7%	6,7%
4. Can <i>Chat GPT</i> improve your performance and time efficiency in learning?	SM	M	KD	TP
	10%	60%	23,3%	6,7%

Factors that influence students to use *Chat GPT* in completing course assignments based on the results of the questionnaire above for the answer weight category on the first question (1) are highest showing that 56.7% of students stated that they sometimes use *Chat GPT* in completing each course assignment. For the second question (2) the highest answer of 43.3% of students stated that *Chat GPT* helped them in completing academic assignments quickly, the third question (3) 50% of students stated that *Chat GPT* was useful for them in completing each course assignment, and on the fourth question (4) 60% of students stated that *Chat GPT* could improve their performance and time efficiency in learning.

Table 3. Convenience in the use of *GPT Chat*

Question	Answer			
1. Can <i>Chat GPT</i> help you solve a problem related to material that is difficult to understand?	SM	M	KD	TP
	6,7%	60%	23,3%	10%
2. Do you agree that interacting with <i>GPT Chat</i> is very easy?	SM	M	KD	TP
	23,3%	66,7%	6,7%	3,3%
3. Do you agree that interacting with <i>GPT Chat</i> is clear and understandable?	SS	S	KD	TP
	3,3%	46,7%	46,7%	3,3%
4. Do you find it easy to manage academic assignments using <i>GPT Chat</i> ?	SM	M	KD	TP
	3,3%	43,3%	46,7%	6,7%

The ease of use of *Chat GPT* for students, especially in solving problems that are difficult to understand based on the first question (1) the highest answer, namely 60% of students stated that *Chat GPT* can help them solve a problem related to material that is difficult to understand, the second question (2) 66.7% of students stated that it is easy to interact with *Chat GPT*, in the third question (3) there were two different responses with the same results, namely 46.7% of students agreed that interacting with *Chat GPT* was clear and understandable while others (46.7%) stated that sometimes for students interacting with *Chat GPT* was clear and understandable. The fourth question (4) was the highest answer, 46.7% of students stated that managing academic assignments using *GPT Chat* is sometimes easy, the rest with different responses.

Table 4. Confidence levels and social interaction when using *GPT Chat*

Question	Answer			
	SPD	PD	KD	TPD
1. Are you not hesitant and confident when using <i>GPT Chat</i> for academic purposes?	0%	30%	50%	20%
2. Do you agree that to complete educational tasks today is easier by using AI in the form of <i>Chat GPT</i> ?	SS	S	KD	TS
	6,7%	46,7%	26,7%	20%
3. Is the use of <i>GPT Chat</i> valued and supported by your family and friends?	SD	DD	KD	E.G.
	3,3%	46,7%	43,3%	6,7%
4. Do you use <i>Chat GPT</i> because it follows trend?	SS	S	KD	TS
	0%	40%	20%	40%
5. When you use <i>GPT Chat</i> do you recommend this platform to your friends?	SM	M	KD	TP
	16,7%	26,7%	33,3%	23,3%

The level of confidence and social interaction when using *Chat GPT* for students based on the answers to the questions above shows that in the first question (1) 50% of students stated that they are sometimes hesitant and sometimes confident when using *Chat GPT* for academic purposes, the second question (2) 46.7% of students stated that they agree that using AI is *Chat GPT* in completing current educational tasks more easily, the third question (3) 46.7% of students stated that so far they have been using *Chat GPT* to be held and even appreciated by family and friends, the fourth question (4) has two different responses with the same results namely 40% of students said they agree if they currently use *Chat GPT* because it follows the trend and others disagree if using *Chat GPT* because it follows the trend, question five (5) 33.3% of students stated that they recommend to their friends to use *Chat GPT*.

Table 5. Perceived security in using *GPT Chat*

Question	Answer			
	SP	P	KP	TP
1. Do you believe that the activity you use in using <i>GPT Chat</i> is secure and private?	0%	30%	56,7%	13,3%
	SP	P	KP	TP
2. Are you sure the personal information you use on <i>GPT's Chat platform</i> can be kept confidential?	0%	30%	56,7%	13,3%
	SP	P	KP	TP
3. Are you sure that by using <i>GPT Chat</i> your academic tasks will be answered correctly?	0%	30%	60%	10%
	SP	P	KP	TP
4. Are you sure and not worried in using <i>GPT Chat</i> that others will not be able to access your account?	0%	50%	36,7%	13,3%
	SP	P	KP	TP

The level of security that students feel in using *Chat GPT* Based on the questions above, for the first (1) and second (2) questions 56.7% of students stated that they lacked trust in the level of security *Chat GPT* When they activate it, there are concerns about confidential personal data, Third question (3) 60% of students stated that they did not believe in the accuracy of the answer results *Chat GPT* Regarding the academic assignments they received, question four (4) 50% of students stated that they believe others will not be able to access their account at the time they use *Chat GPT*.

Table 6. The ability of students to analyze and evaluate questions in accordance with the provisions of higher-order thinking skills

Question	Quality of Answers by respondents (people)			
	ST	T	KT	TT
1. What do you know about(C5)	3	5	14	8
2. According to the brother, from where.....(C4)	2	8	5	15
3. Do you think ethical rules are important inwhy...? (C5)	2	17	9	2
4. According to you, what is the level of accuracy of utilization.....explain the results of your analysis (C4)	4	16	10	0
5. Do you agree when.....why...?? (C5)	3	10	14	3
6. Why do you think people tend to do...(C5)	0	16	8	6
7. According to you, the right combination between....with....is?. (C6)	2	15	12	1
8. Make proposals for changes or improvements that can make the educational conditions around you even better in the current generation Z era (C6)	4	18	4	4

Table 6 above is the result of observations made on students on students' ability to answer every question orally both asked by lecturers to students and those asked by students to other students during lectures. The results of observations show that the ability of students to answer and analyze questions for the cognitive realm of analysis level (C4) very precisely contained in point 2 there are 2 people (6.67%) and point 4 there are 4 people (13.3%). Throughout the observations made when students tried to answer these questions, they did not use the internet at all to use AI to get answers to the questions given, but rather to read the books they brought with them during lectures. So when they answer the question still use their analysis of the contents of the book they read. For the exact results in point 2 there were 8 people (26.7%) while in point 4 there were 16 people (53.3%). The results of observations made show that on several occasions students open the internet more to find answers to the questions asked, this condition indicates their ability to answer questions more focused on internet search results without further analyzing whether the answers are relevant or not. In contrast to students' answers that are not precise or incorrect. Among them, there are those who answer questions by

using *GPT Chat* directly to find answers to the questions given and some rely on their reasoning skills alone, so the answers submitted are not perfect.

At the evaluation level (C5) contained in points 1, 3, 5 and 6 shows the results of varying student abilities. In points 1 and 5, the average student answered incorrectly. Based on observations, almost all students use the internet to find answers to questions given and the average student uses *Chat GPT* to help find answers to questions given, but the results are 14 people (46.7%) for points 1 and 5 answered incorrectly. In point 3 there were 17 people (56.7%) answering questions correctly and point 6 as many as 16 people (53.3%). Students who have answered the above questions both orally and in writing generally use *Chat GPT* to find appropriate answers.

At the creation level (C6) contained in questions points 7 and 8, the average student managed to answer correctly, namely 15 people (50%) answered point 7 and 18 people (60%) answered point 8. The questions presented above are generally contextual questions, meaning that the problem is taken from things related to students in everyday life. So that the solution should not be different from the problems they face in their environment (Mariati, 2018)

Conclusion

Artificial Intelligence (AI) began to enter Indonesia and developed rapidly, especially in the scope of education, especially in the world of lectures at the end of November 2022 by Open Artificial Intelligence (AI) with services that were initially launched for free with the aim of being able to overcome the services needed. AI is a branch of computer science whose main goal focus refers to the development of a computer system and can be relied upon or able to complete tasks that require intelligence contained in humans with the aim of improving the ability of machines to think, learn, and adapt in ways that are increasingly similar to humans, and can also be used in various applications, Starting from automating increasingly difficult and diverse tasks. The type of AI most often used by students today is *Chat GPT* which is one part of AI in the form of an automatic answer search engine in text form.

However, based on the results of research that has been conducted on accounting education students, it turns out that 93.3% of students already *know Chat GPT* and have used it in completing lecture assignments, but there are still those who have never used it at all for the reason that they do not know this *chatboot* application well. From several questions that have been done that in general students use *Chat GPT* in completing lecture assignments only occasionally, although some of them are classified as very active, this is influenced by the level of student confidence in the accuracy of the answers provided by the *chatboot* application. The ease of use of *Chat GPT* for students, especially in solving problems that are difficult to understand, is the main attraction for them to use the application, even though they do not fully believe in the level of security of their accounts when using the application repeatedly.

Chat GPT has provided a positive side for students in getting answers to every educational problem, but we cannot deny that there are negative sides obtained such as students are not fully sure of the desired results, they worry about the uncertainty of answers obtained through *Chat GPT* which can affect their critical thinking skills. The emergence of *ChatGGPT* shows the lack of confidence of students in answering each case directly without opening the internet. Confidence in the correctness of the answer becomes something that is conveyed by students. Their orientation when observed was on the ability to answer, not on the quality of the answers. So that the truth of the answer before being delivered or written down is not analyzed first by students even in writing, the display of the *GPT Chat* form is really not changed at all.

In some writings, researchers find it difficult to distinguish between student writing based on independent responses and written results from *chatbot* applications, but when the answers are asked to be answered orally, researchers can see directly their ability to deliver answers.

Given the challenges associated with assessing student assignments completed using *Chat GPT*, there are several strategies that can be used to meet these challenges, especially in honing students' thinking skills. First, each lecturer can give clear and detailed instructions to students on how to complete each assignment. The goal is to assist lecturers in ensuring that the completed assignments are written in a more structured and coherent way. Second, lecturers can use assessment rubrics to evaluate the quality of student work. This can help in ensuring that students' effort and understanding of assignments are assessed accurately. Third, lecturers can use a combination of automatic and manual assessment techniques to evaluate students' understanding of high-level cognitive cases, especially the categories of analysis (C4), evaluation (C5) and creation (C6). Fourth, lecturers can make assessments that require students to demonstrate their critical thinking, problem-solving and communication skills. For example by asking them to engage in group discussions, presentations or even other interactive activities that involve the application of their knowledge and skills. This can reduce students' ability to use *GPT Chat* or other AI applications to complete their assignments and encourage critical thinking skills as part of higher-order thinking skills.

Reference

- Brown, T. B., Krueger, G., Mann, B., Askill, A., Herbert-voss, A., Winter, C., Ziegler, D. M., Radford, A., & Mccandlish, S. (2020). *Language Models are Few-Shot Learners. NeurIPS*.
- Cholissodin, I., & Soebroto, A. A. (2021). *AI, MACHINE LEARNING & DEEP LEARNING (Teori & Implementasi)*. July 2019.
- Cotton, D. R. E., Cotton, P. A., Shipway, J. R., Cotton, D. R. E., Cotton, P. A., Mar, J. R. S., & Cotton, D. R. E. (2023). Chatting and cheating : Ensuring academic integrity in the era of *Chat GPT* Chatting and cheating : Ensuring academic integrity in the era. *Innovations in Education and Teaching International*, 00(00), 1–12. <https://doi.org/10.1080/14703297.2023.2190148>
- Di, M., Tinggi, P., Marlin, K., Tantrisna, E., Mardikawati, B., Anggraini, R., Susilawati, E., Mahmud, U. I. N., Batusangkar, Y., Bangsa, U. C., Transportation, P., & Bali, D. (2023). *Benefits and Challenges of Using Artificial Intelligences (AI) Chat GPT on the Ethical and Competency Education Process*. 3, 5192–5201.
- Erizal, R. M., Safitra, A., Mulia, P. F., & Azmi, Z. (2024). *Analyze the use of artificial intelligence using the Chat-GPT platform to support the educational process for students*. 2(1).
- Golden, B. (2023). *Enabling critical thinking development in higher education through the use of a structured planning tool*. <https://doi.org/10.1080/03323315.2023.2258497>
- Hariani, P. P., Wastuti, S. N. Y., Mahdalena, L., & Barus, W. I. (2020). Utilization of E-Learning in Distance Learning during the Covid-19 Pandemic. *Biblio Couns: Journal of Counseling and Education Studies*, 3(2), 41–49.
- Maphosa, V., & Maphosa, M. (2023). Artificial intelligence in higher education : a bibliometric analysis and topic modeling approach. *Applied Artificial Intelligence*, 37(01). <https://doi.org/10.1080/08839514.2023.2261730>
- Maula, S. R., Aprillian, S. D., & Rachman, A. W. (2024). *The dependence of Jember*

- University students on Artificial Intelligence (AI)*. 2(1).
- Novihana, A. (2019). *Science Teaching Innovation in Industry 4 . 0 To Students' Higher Order Thinking Skills in Biotechnology*.
- Pakpahan, R., Studi, P., Information, S., Information, F. T., Bina, U., & Informatics, S. (2021). *ANALYSIS OF THE EFFECT OF ARTIFICIAL IMPLEMENTATION*. 5(2), 506–513. <https://doi.org/10.52362/jisicom.v5i2.616>
- Education, J. R. (2023). *THE IMPACT OF USING ARTIFICIAL INSIDE*. 6, 2180–2187.
- Saehu, U. A. (2017). *Character-Oriented Development of Accounting Teaching Materials and Higher Order Thinking Skills (HOTS)*. 391–403.
- Sihotang, I. M. (2015). Computer-Based Learning Media in Preparing Financial Statements. *National Seminar on Management Economics and Accounting (Snema) Faculty of Economics, Padang State University, c*, 541–546.
- Yeboah, D., & Nyagorme, P. (2022). Students' acceptance of WhatsApp as teaching and learning tool in distance higher education in sub-Saharan Africa. *Cogent Education*, 9(1). <https://doi.org/10.1080/2331186X.2022.2077045>