The Effect of Chatbot Use and Educational Information Technology on Self Regulated Learning and Its Implications of Jakarta State University Student

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Abstract The development of artificial intelligence technology, especially the use of AI-based chatbots, has brought about a major transformation in the world of higher education. This study aims to analyze the effect of using chatbots and educational information technology on Self Regulated Learningand academic ethics of Jakarta State University students. With a quantitative approach and Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis method, data were collected from active students of various faculties through an online questionnaire. The results showed that the use of chatbots and educational information technology had a significant direct effect on students' academic ethics, but not significant on Self Regulated Learningdirectly. However, through the mediation of academic ethics, both have a significant indirect effect on learning independence. These findings suggest that academic ethics play an important role in bridging technology utilization with students' learning patterns. This study also highlights the limitations of using solely quantitative methods and limited respondent coverage. The implications of the results of this study recommend the need for ethical integration of technology in learning as well as increasing digital ethics literacy in the university environment.(Azizah & Subiyantoro, 2023)

Keywords Chatbot, Educational Information Technology, Learning Independence, Academic Ethics, Students, Higher Education, Artificial Intelligence, AI, Digital Ethics

Introduction

The rapid development of artificial intelligence (AI) technology has changed various aspects of life, including the field of higher education. One implementation of AI that has grown significantly is the use of AI-based chatbots, which are able to simulate human conversations to assist the learning process. Chatbots are tools used by students to understand difficult concepts, organize assignments, and get academic references quickly and efficiently (Adamopoulou & Moussiades, 2020). Data shows that Indonesia is the country with the most chatbot users in the ASEAN region, with the percentage of ChatGPT users reaching 5.01% (HEPI, 2023). The use of AI chatbots among students is not only used to summarize articles, draft concepts, and search for research ideas, but has also begun to be utilized in the academic assessment process. This phenomenon raises a crucial question: does the use of chatbots have a positive impact or does it interfere with students' academic independence and ethics?

On the other hand, educational information technology also plays an important role in promoting learning effectiveness and efficiency. This technology allows access to various digital learning resources, enhances online collaboration, and strengthens independent learning through interactive learning media (Miarso, 2007). However, the use of technology also raises the potential for abuse, such as plagiarism, decreased creativity, and dependence on search engines (Nugraha, 2020).(Kurnia Devi et al., 2021). The theoretical foundation used in this study includes the concept of self-regulated learning, which is the ability of students to manage their learning process independently without depending on other parties (Brookfield in Kerlin, 1992), and academic ethics, which is a set of moral norms that must be adhered to in the academic process (Zein, 2023). Some important indicators in academic ethics include honesty, responsibility, and respect for the scientific work of others (Fitriani et al., 2022). The urgency of this research lies in the increasing use of chatbots among university students, which comes with the risk of academic misconduct. Previous studies have extensively examined the effectiveness of There are many studies on chatbots in customer service or e-commerce, but not many

have focused on their impact on aspects of student character such as independence and ethics. Therefore, this research is important to answer the void of literature in the context of higher education in Indonesia. Specifically, the purpose of this study is to analyze the effect of using chatbots and educational information technology on Self Regulated Learningand academic ethics of Universitas Negeri Jakarta students, and to examine the mediating role of the Self Regulated Learningvariable in the relationship.(Rifky, 2024). This study also identified a research gap, namely the absence of empirical studies that simultaneously examine the relationship between chatbots, educational information technology, learning independence, and student academic ethics. Most of the previous studies were descriptive or qualitative without testing the causal relationship between variables using a comprehensive quantitative approach. The novelty of this research is in the integration of chatbots and educational information technology as predictors of academic ethics, with Self Regulated Learningas a mediator. In addition, this study also provides a theoretical contribution by developing a model of the relationship between digital technology and student academic character, as well as a practical contribution for educational institutions in formulating policies for the ethical use of AI.(Gudiato et al., 2023).

Literature Review

Use of Chatbot

The use of chatbots in education is an implementation of artificial intelligence that allows automatic communication between the system and users, especially students. The theory underlying the use of chatbots in learning is Cognitive Load Theory (Sweller, 1988), which states that interactive learning media can reduce cognitive load and increase learners' focus on information processing. Chatbots can provide instant answers, personalized feedback, and flexible learning assistance, making it an adaptive and efficient learning tool. Research by Smutny and Schreiberova (2020) in Education and Information Technologies states that chatbots can increase student motivation and learning efficiency, especially in online learning environments. In Indonesia, a study by Fadhilah and Sari (2023) showed that WhatsApp- based chatbots improve material understanding and interaction in learning. However, there are also concerns that excessive use of chatbots may reduce students' critical thinking skills and independent initiative. The similarity between previous research and this study lies in the focus of using chatbots in the context of education. The difference is that this study relates chatbots not only to learning outcomes, but also to student academic ethics, which is a new and profound issue. Thus, the contribution of this research lies in the critical examination of the moral and ethical implications of intelligent technology interaction in academia.(Adamopoulou & Moussiades, 2020)

Educational Information Technology

Educational Information Technology encompasses the use of hardware and software to support the learning process, including Learning Management System (LMS), learning apps, and AI- based platforms such as chatbots. *Connectivism* theory (Siemens, 2005) asserts that knowledge is stored in digital networks and learning occurs through interaction with technology. This means that the utilization of technology is not only as a tool, but also as part of the learning ecosystem itself. Research by Goktas, Yildirim & Yildirim (2009) shows that the success of technology integration in education is highly dependent on institutional readiness and educators' digital competencies. At the local level, Saputri and Santoso (2022) confirmed that information technology plays an important role in increasing learning motivation and effectiveness, especially when learning online during the pandemic. The similarity between the previous study and this study is the emphasis that educational technology improves the quality of learning. However, this study differs in that it places technology as a contextual factor that influences the relationship between chatbot usage and academic ethics. In other words, this study not only assesses the learning outcomes, but also the academic integrity of students in using technology ethically (Nam & Bai, 2023).

Self Regulated Learning

Self Regulated Learningis the ability of individuals to manage their learning process actively and responsibly, without fully depending on other parties. The theory underlying this variable is *Self-Directed Learning Theory* (Knowles, 1975), which emphasizes the importance of self-control, self-evaluation, and intrinsic motivation in the learning process. Independent students tend to be more

disciplined, structured, and able to utilize learning technology optimally. Research by Zimmerman (2002) shows that Self Regulated Learninghas a strong relationship with academic achievement and ability to use technology. Rahayu and Azizah (2020) in their research found that students with high levels of independence are more likely to have academic integrity and are able to avoid cheating behavior when learning online. Many previous studies have linked Self Regulated Learning with academic outcomes or learning effectiveness. In the context of this study, the main difference is that Self Regulated Learningis seen as a variable affected by the use of chatbots, with academic ethics as moderation. This provides a new perspective, that technology not only supports learning, but can also shape learning character if it is associated with moral aspects.(Kusuma, 2020).

Academic Ethics

Academic ethics reflects the moral principles and values that underlie one's behavior in education, such as honesty, responsibility, originality, and respect for intellectual property rights. Kohlberg's (1984) *Moral Development Theory* explains that individuals go through stages of moral development, which influence their decision to behave ethically or not in an academic context. A study by McCabe, Trevino, and Butterfield (2001) showed that academic ethics violations, such as plagiarism and cheating, often occur due to academic pressure and lack of moral awareness. Hadi and Purwoko (2022) in the Indonesian context found that the use of technology that is not accompanied by an understanding of ethics can actually facilitate systematic academic cheating, such as the use of chatbots to answer assignments without understanding.(Azizah & Subiyantoro, 2023) This research is in line with previous studies in highlighting the importance of academic ethics in the digital era. However, it is different because it places academic ethics as a moderating variable-which serves to strengthen or weaken the influence of technology (chatbot) on self-learning behavior. Thus, this approach emphasizes the importance of character and moral values in facing the challenges of technology-based learning.(Sagala, 2022)

Research Hypotesis

H1 : The effect of using chat bots on the academic ethics of Jakarta State University students
H2 : The influence of the use of information technology on the academic ethics of Jakarta State University students
H3: The influence of learning independence on the academic ethics of Jakarta state university students
H4: The influence of the use of chat bots on the independence of learning of students of Jakarta state university
H5: The effect of the use of information technology on the learning independence of students of Jakarta state university
H6: Learning independence mediates the effect of using chatbots on the academic ethics of Jakarta state university students
H7: Learning independence mediates the effect of the use of information technology on the academic ethics of Jakarta state university students

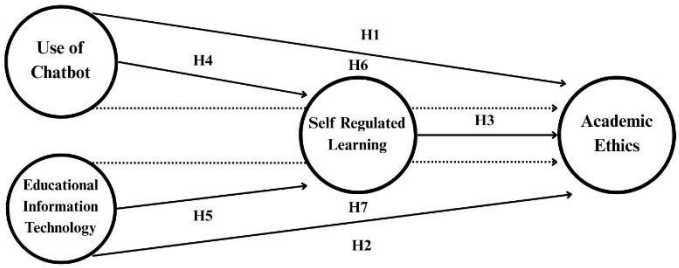

Figure 1 : Conceptual Frameworl

Methods

This study uses a quantitative approach with a survey method, aiming to analyze the effect of using chatbots and educational information technology on academic ethics with Self Regulated Learningas a mediating variable. Primary data were collected using an online questionnaire designed based on a five-point Likert scale, with responses ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The population in this study were all active students of Universitas Negeri Jakarta from various faculties and semester levels. While the sample was determined by purposive sampling technique, namely the selection based on the criteria of active students who have used chatbots (such as ChatGPT, Perplexity, Deepseek) and educational information technology (such as LMS and other digital learning applications). The number of samples is targeted at a minimum of 100-120 students, adjusting the analysis with the Structural Equation Modeling (SEM) method. The research instrument was developed based on indicators that have been validated by previous studies. For the variable of chatbot usage (X1), the indicators used refer to ease of access, speed of response, clarity of information, and support for independent learning, adapted from Winkler & Söllner (2018). The variable of educational information technology (X2) refers to the utilization of technology in the learning process, digital competence, and support for independent learning, referring to Miarso (2007). Meanwhile, the Self Regulated Learningvariable (Y) was developed from the Self-Regulated Learning theory by Brookfield in Kerlin (1992) and Zimmerman (2000). For the academic ethics variable (Z), indicators include academic honesty, responsibility, respect for others, and respect for others.other people's scientific work, compliance with rules, and research integrity, referring to McCabe et al. (2001), Lang (2010), and Ramadhani (2023).

Data collection techniques were conducted through online questionnaires using Google Forms and distributed through communication platforms such as WhatsApp and student social media. The questionnaire included items to measure all variables studied and some demographic data such as age, faculty, and semester. Data analysis techniques were carried out using Partial Least Squares Structural Equation Modeling (PLS- SEM) with the help of SmartPLS software. This analysis was chosen because it is able to test complex structural models, including direct and indirect effects between variables and the role of mediation. Construct validity was tested through convergent validity (outer loading > 0.7) and discriminant validity (Fornell-Larcker). Reliability is tested with Cronbach's Alpha and Composite Reliability values. The conceptual framework built in this study describes the relationship between the use of chatbots (X1) and educational information technology (X2) as independent variables, Self Regulated Learning(Y) as a mediator, and academic ethics (Z) as the dependent variable. This model integrates the learning technology approach with ethical academic values.

Results & Discussion

Table 1: Validity and Reliability of Instruments

Construct	Indicator	Loading Factor	Evaluation
Use of Chatbot	X1.1	0.796	Valid
Use of Chatbot	X1.2	0.792	Valid
Use of Chatbot	X1.4	0.833	Valid
Use of Chatbot	X1.5	0.78	Valid
Education Information Technology	X2.2	0.827	Valid
Education Information Technology	X2.3	0.866	Valid
Learning Independence	Y1.1	0.771	Valid
Learning Independence	Y1.3	0.71	Valid
Learning Independence	Y1.5	0.767	Valid
Academic Ethics	Z1.1	0.769	Valid
Academic Ethics	Z1.2	0.746	Valid
Academic Ethics	Z1.3	0.838	Valid
Academic Ethics	Z1.5	0.72	Valid

This research uses a quantitative approach with instruments in the form of questionnaires that have been tested for validity and reliability. Based on the convergent validity analysis using the loading factor value, all variable indicators show values above 0.70, which indicates that all indicators are valid and able to measure the construct accurately. For example, indicators of chatbot usage (X1) ranged from 0.78-0.833; educational information technology (X2) between 0.827-0.866; Self Regulated Learning(Y) between 0.71-0.771; and academic ethics (Z) between 0.72-0.838.

Table 2: Multicollinearity

	VIF
X1,1	2.084
X1,2	1.916
X1,4	1.856
X1,5	1.624
X2,2	1.235
X2,3	1.235
Y1,1	1.168
Y1,3	1.237
Y1,5	1.320
Z,1	1.632
Z1,2	1.708
Z1,3	1.898
Z1,5	1.328

Meanwhile, the reliability test results show that most constructs have Cronbach's Alpha and composite reliability above 0.70. However, two variables, X2 and Y, have values below this limit, although their AVE still meets the requirement of >0.50. This indicates that although internal consistency is not optimal, the instrument is still feasible to use to analyze convergent and discriminant validity.

Classical Assumption Test

An important aspect of model testing is to ensure that there are no violations of classical assumptions, particularly multicollinearity. The VIF test results show that all indicators have values below 2.1, well below the threshold of 10. This indicates that there is no multicollinearity problem between the independent variables, and the regression model used is stable and can be interpreted properly.

Discriminant Validity

Testing discriminant validity using the Fornell-Larcker Criterion shows that the AVE square root value

of each construct is greater than the correlation between other constructs. This proves that each construct is able to distinguish itself from other constructs, so that each variable in this study statistically meets the criteria for discriminant validity. Analysis of the Coefficient of Determination (R^2) and Effect Size (F^2) The R^2 test results show that 38.9% of the variation in Self Regulated Learning(Y) is explained by X1 and X2, and 38.3% of the variation in academic ethics (Z) is also explained by these two variables. The adjusted R^2 value of 0.370 indicates that the model has moderate predictive power. F^2 is used to measure the contribution of each independent variable to the dependent variable. The F^2 value for X1 on Y is 0.003 (very small), while X2 on Z reaches 0.331, which is classified as medium to large. This suggests that educational information technology has more impact on academic ethics than the use of chatbots.

Table: 3 Direct Hypothesis Testing

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
X1, -> Y	0.048	0.058	0.108	0.441	0.660
X1, -> Z	0.228	0.247	0.096	2.380	0.017
X2, -> Y	0.147	0.134	0.131	1.116	0.265
X2, -> Z	0.492	0.488	0.089	5.536	0.000
Z -> Y	0.503	0.511	0.125	4.035	0.000

The direct effect of chatbot use (X1) on Self Regulated Learning(Y) is not significant (p= 0.660), indicating that chatbots have not directly encouraged independent learning behavior. In contrast, the effect of X1 on academic ethics (Z) is significant (p= 0.017), indicating that interaction with chatbots can shape students' academic ethics through automatic regulation and reminders of plagiarism, integrity, or discipline. The effect of educational information technology (X2) on Self Regulated Learningis also not significant (p = 0.265), but its effect on academic ethics is very significant (p = 0.000). This is in line with previous research which states that the integration of educational technology as a whole increases students' understanding of academic norms (Rahmat & Fauzan, 2021). Academic ethics (Z) is proven to have a direct and significant effect on learning independence (Y) (p = 0.000). This means that students with good academic ethics tend to have higher independence in the learning process, because they avoided dependence on others and demonstrate commitment to their own learning responsibilities.

Table 4: Indirect Effect

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
X1, -> Z -> Y	0.115	0.124	0.054	2.113	0.035
X2, -> Z -> Y	0.248	0.254	0.088	2.819	0.005

A significant indirect effect of chatbot use on Self Regulated Learningthrough academic ethics was found (p= 0.035). This suggests that chatbots can be a catalyst for increasing learning independence, but not through a direct mechanism, but through strengthening academic values. Similarly, the indirect effect of X2 on Y through Z was also significant (p = 0.005), even stronger than the path from X1. This result confirms that the integration of technology in education does not necessarily promote learning independence, but when combined with a strong understanding of academic ethics, technology becomes a very effective tool.Discussion and ImplicationsThe findings support the conceptual model that academic ethics acts as a mediator between technology and learning behavior. This is also in line with the findings from Yusuf et al. (2022), who emphasized the importance of ethics in digital education to prevent misuse of technology. Theoretically, these results reinforce Bandura's Social Cognitive Theory, which states that human behavior (in this case learning independence) is influenced by the interaction between the environment (educational technology, chatbot) and personal values (academic ethics). Chatbots and technology are just tools, and their effectiveness depends on the internalization of values that students have. The practical implication of this research is the need to strengthen academic ethics education in every digital intervention in higher education. Chatbots are not just a tool

for administration or academic guidance, but can also be designed to shape student character through interactions that instill ethical values.

Conclusion

This study shows that the use of chatbots and educational information technology has a significant influence on students' academic ethics, but does not directly affect learning independence. The results of the hypothesis test indicate that the use of chatbots (X1) and educational information technology (X2) has a significant effect on academic ethics (Z), with p-values of 0.017 and 0.000, respectively. However, neither has a direct significant impact on learning independence (Y), as evidenced by p-values exceeding 0.05. Conversely, academic ethics is proven to have a significant impact on learning independence (p = 0.000) and significantly mediates the influence of X1 and X2 on Y (p = 0.035 and 0.005). This confirms that academic ethics values are key in bridging technology with student learning behaviour. The limitations of this study lie in its quantitative approach, which relies solely on respondents' perceptions through questionnaires, thus failing to capture the depth of behaviour or contextual motives for technology use. Additionally, the sample scope is limited to one university, so generalising the findings to a broader population requires caution. Based on these results, future research is recommended to use a mixed-methods approach to explore the relationship between technology, ethics, and learning behaviour more deeply. The addition of variables such as learning motivation, digital habits, and emotional regulation can also enrich the conceptual model. Furthermore, the development of chatbots with educational functions integrated with digital ethics principles can be an impactful intervention in promoting sustainable learning independence.

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