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Analyzing ChatGPT Impact on Student Productivity in Information Technology Program at Politeknik Negeri Tanah Laut

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Abstract–The rapid development of generative artificial intelligence, particularly ChatGPT, has transformed the way students complete academic tasks, especially in the field of Information Technology. Despite its widespread adoption, concerns remain regarding its impact on students' productivity and learning quality. This study aims to analyze the effect of ChatGPT usage on the productivity of students in the Information Technology Study Program at Politeknik Negeri Tanah Laut. A quantitative research approach with a survey method was employed. Data were collected through a Likert-scale questionnaire distributed to active students who had used ChatGPT for academic purposes. The collected data were analyzed using validity and reliability tests, followed by simple linear regression analysis to examine the effect of ChatGPT usage on student productivity. The results indicate that ChatGPT usage has a positive and significant effect on student productivity. Productivity improvements are mainly observed in task efficiency and timely task completion. However, the quality of academic outputs remains highly dependent on students' ability to critically evaluate, verify, and further develop the outputs generated by ChatGPT. These findings suggest that ChatGPT functions effectively as an academic assistant rather than a substitute for critical thinking and independent learning. This study concludes that ChatGPT can be utilized as a supportive academic tool to enhance student productivity when used appropriately and responsibly, supported by adequate AI literacy and academic supervision. The findings are expected to provide empirical insights for higher education institutions in formulating policies and guidelines for the ethical and productive use of ChatGPT in academic activities..

Keywords: ChatGPT; Student Productivity; Artificial Intelligence; Information Technology; Higher Education

1. INTRODUCTION

The utilization of generative artificial intelligence (GenAI) based on large language models such as ChatGPT has grown rapidly in higher education environments over the past five years. Students increasingly rely on ChatGPT to assist with completing assignments, understanding course materials, writing reports, and supporting programming-related activities. However, this phenomenon raises a major academic concern, namely the lack of clear empirical evidence on whether the use of ChatGPT genuinely enhances students' academic productivity in a sustainable manner, or instead leads to dependency, reduced depth of understanding, and an increased risk of academic integrity violations. In the Information Technology (IT) Study Program, this issue becomes more complex because ChatGPT is used not only for writing tasks but also for code generation, debugging, and technical documentation, all of which directly affect the quality of graduates' competencies. Therefore, the expected outcome of this research is the availability of measurable empirical evidence regarding the impact of ChatGPT usage on the productivity of IT students, which can serve as a basis for formulating productive, ethical, and learning-outcome-aligned usage recommendations within vocational education.

Several previous studies have examined the impact of GenAI and ChatGPT from various perspectives. An experimental study by Noy and Zhang demonstrated that the use of ChatGPT significantly improved productivity in writing tasks, as indicated by reduced completion time and improved output quality [1]. Similar findings were reinforced by Brynjolfsson et al., who reported that GenAI enhances work productivity, particularly among users with lower initial skill levels [2]. Although these studies were conducted in professional contexts, their findings are relevant to academia, as student activities are likewise dominated by cognitive tasks such as writing, analysis, and solution development.

In the context of higher education, several systematic literature reviews (SLRs) have reported that ChatGPT is widely used as a learning support tool, writing assistant, and source of conceptual clarification [3], [4]. Imran and Almusharraf emphasized that ChatGPT has the potential to improve the efficiency of academic writing, but requires strengthened literacy and policy frameworks to prevent the erosion of learning objectives [5]. Other studies have highlighted that despite its convenience, ChatGPT poses serious challenges, including the risk of inaccurate responses, bias, and overreliance [6], [7].

From the perspective of academic integrity, multiple studies have identified ChatGPT as a potential threat if its use is not properly regulated. Bin-Nashwan et al. stated that academic integrity is in a critical position, as ChatGPT's time-saving features are often the primary motivation for student usage [8]. Other research has also emphasized the need for assessment redesign and ethical approaches in the adoption of GenAI in higher education [9], [10]. International organizations such as UNESCO and the OECD have further stressed the importance of governance, AI literacy, and human-centered approaches in the implementation of GenAI within the education sector [11], [12].

In the field of Information Technology and programming, empirical studies indicate that ChatGPT can assist students in understanding syntax, generating code examples, and supporting the programming learning

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process [13]. However, Bringula found that the use of ChatGPT in programming courses also has limitations, such as a tendency to produce generic solutions and potential logical errors that require verification by both lecturers and students [14]. More recent studies have even shown that unguided use of ChatGPT may negatively affect creativity and team collaboration in programming projects [15].

Based on the related studies discussed above, the research gap in this study can be identified as follows: (1) most GenAI productivity research has been conducted in professional contexts rather than among vocational students; (2) studies in higher education remain predominantly conceptual or perception-based, without comprehensive productivity measurement; (3) research in the IT field has not specifically differentiated ChatGPT usage purposes (learning, writing, or programming) in relation to productivity; and (4) there is a lack of contextual research focusing on Information Technology students in polytechnic institutions, particularly at Tanah Laut State Polytechnic.

Therefore, the objective of this study is to analyze the impact of ChatGPT usage on the productivity of students in the Information Technology Study Program at Tanah Laut State Polytechnic. This research is expected to contribute by mapping student usage patterns of ChatGPT, measuring its impact on academic productivity, and providing practical recommendations for study programs in developing policies and strategies for productive, ethical, and competency-oriented utilization of ChatGPT..

2. RESEARCH METHODOLOGY

2.1 Research Stages

The research stages were systematically designed to ensure that the research process was conducted in a structured manner and produced findings aligned with the research objectives. In general, this study consisted of several main stages, namely preliminary study, problem and variable formulation, data collection, data processing and analysis, and conclusion drawing. These stages illustrate the flow of the research methodology applied to analyze the impact of ChatGPT usage on the productivity of students in the Information Technology Study Program at Tanah Laut State Polytechnic.

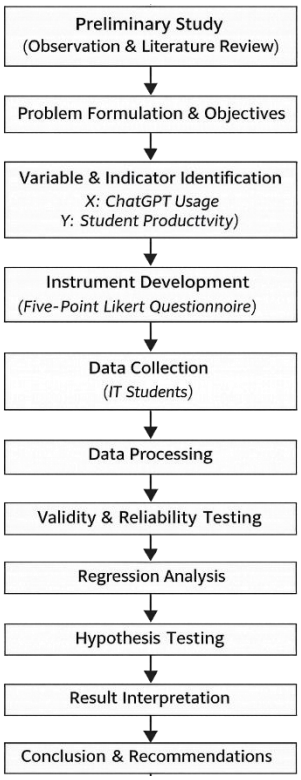

Figure 1. Research Stages Flowchart

1. Preliminary Study
   The initial stage of the research was conducted through a preliminary study involving observation and literature review. The literature review aimed to understand the concepts of generative artificial intelligence, particularly ChatGPT, student productivity, and relevant analytical methods. At this stage, the phenomenon of ChatGPT usage by Information Technology students in completing academic assignments was also identified.

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2. Problem Formulation and Research Objectives
   Based on the results of the preliminary study, the research problem was formulated with a focus on the impact of ChatGPT usage on student productivity. Subsequently, the research objectives were defined to analyze the relationship and the degree of influence of ChatGPT usage on students' academic productivity.
3. Determination of Research Variables and Indicators
   At this stage, the research variables were determined, consisting of the independent variable (ChatGPT usage) and the dependent variable (student productivity). Each variable was further operationalized into several measurable indicators, which served as the basis for developing the research questionnaire.
4. Development of Research Instruments
   The research instrument was developed in the form of a questionnaire using a five-point Likert scale. The questionnaire was designed to measure the level of ChatGPT usage and student productivity based on the predetermined indicators. The instrument was then prepared for the data collection process.
5. Data Collection
   Data collection was carried out by distributing the questionnaire to respondents, namely active students of the Information Technology Study Program at Tanah Laut State Polytechnic who had used ChatGPT in academic activities. The collected data constituted primary data, which served as the basis for subsequent analysis.
6. Data Processing and Analysis
   The collected data were processed using statistical software. The data analysis stages included validity testing, reliability testing, and linear regression analysis to determine the effect of ChatGPT usage on student productivity. In addition, hypothesis testing was conducted to assess the significance of the influence of the research variables.
7. Interpretation of Results and Conclusion Drawing
   The final stage of the research involved interpreting the results of the data analysis in relation to the research objectives. Based on these results, conclusions were drawn regarding the impact of ChatGPT usage on student productivity, and recommendations were formulated to serve as considerations for the utilization of ChatGPT in academic environments..

3. Results and Discussion

This section presents the research results and discussion regarding the impact of ChatGPT usage on the productivity of students in the Information Technology Study Program at Politeknik Negeri Tanah Laut. The research data were obtained through the distribution of questionnaires to active students who had used ChatGPT in their academic activities. All collected data were subsequently processed and analyzed using statistical methods to address the research objectives and hypotheses. The presentation of results is supported by tables and descriptive explanations to provide a comprehensive overview of the research findings.

3.1 Respondent Characteristics and Data Description

The analysis begins with a description of respondent characteristics. These characteristics are used to understand the background of the research subjects and to provide context for analyzing the variables of ChatGPT usage and student productivity.

a. Respondent characteristics based on gender

The results indicate that respondents consisted of male and female students with a relatively balanced distribution. Of the total 120 respondents, 72 students (60%) were male and 48 students (40%) were female. This distribution reflects the general composition of students in the Information Technology Study Program, which is still predominantly male.

b. Respondent characteristics based on cohort

Based on academic cohort, respondents came from various academic years. A total of 28 respondents (23.3%) were from the 2021 cohort, 46 respondents (38.3%) from the 2022 cohort, and 46 respondents (38.3%) from the 2023 cohort. These data indicate that ChatGPT usage has reached students across different cohorts.

c. Pengalaman penggunaan ChatGPT

Based on usage experience, 85 respondents (70.8%) had used ChatGPT for more than one semester, while 35 respondents (29.2%) had used ChatGPT for less than one semester. This finding suggests that the majority of respondents have sufficient experience in utilizing ChatGPT to support their academic activities.

Tabel 1. Karakteristik Responden

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Characteristics	Category	Frequency	Percentage
Gender	Male	72	60%
	Female	48	40%
Cohort	2023	28	23.3%
	2024	46	38.3%
	2025	46	38.3%
ChatGPT Experience	< 1 Semester	35	29.2%
	≥ 1 Semester	85	70.8%

3.1.1 Description of ChatGPT Usage Variable

The ChatGPT usage variable was measured using four main indicators: usage intensity, usage purpose, types of assisted activities, and dependency level.

a. Intensity of ChatGPT Usage

The analysis shows that the mean value of ChatGPT usage intensity is 3.98 on a 5-point Likert scale. This indicates that students tend to frequently use ChatGPT in their academic activities.

b. Purpose of ChatGPT usage

The primary purposes of ChatGPT usage include understanding course materials, report writing, and programming assistance. This indicator has a mean value of 4.12, indicating that ChatGPT is perceived as highly helpful in supporting learning processes and task completion.

c. Types of activities assisted by ChatGPT

The activities most frequently assisted by ChatGPT include report outline development, code explanation, and idea generation for problem-solving. The mean value of this indicator is 4.05, indicating that ChatGPT is utilized quite optimally.

d. Level of dependency on ChatGPT

The dependency indicator has a mean value of 3.22. This value indicates that although students frequently use ChatGPT, the level of dependency remains in the moderate category.

Tabel 2. Descriptive Statistics of ChatGPT Usage Variable

Indicator	Mean	Category
Usage intensity	3.98	High
Usage purpose	4.12	High
Assisted activities	4.05	High
Dependency level	3.22	Moderate

3.1.2 Description of Student Productivity Variable

Student productivity was measured using four indicators: timeliness, task efficiency, output quality, and learning independence.

a. Timeliness of task completion

The timeliness indicator has a mean value of 4.08, indicating that students perceive ChatGPT as helpful in completing tasks on time.

b. Task efficiency

Task efficiency obtained a mean value of 4.15. Students perceive that ChatGPT accelerates the process of understanding assignments and initiating task execution.

c. Quality of task outcomes

The quality of task outcomes has a mean value of 3.87. This result indicates that ChatGPT helps improve task quality; however, further verification and development by students are still required.

d. Learning independence

The learning independence indicator has a mean value of 3.54. This suggests that ChatGPT usage can enhance learning independence, although it may potentially reduce it if used excessively.

Table 3. Descriptive Statistics of Student Productivity Variable

Indicator	Mean	Category
Timeliness	4.08	High

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Indicator	Mean	Category
Efficiency	4.15	High
Output quality	3.87	High
Learning independence	3.54	Moderate

3.2 Implementation / Testing

Method testing was conducted to ensure that the research instruments were valid and reliable, as well as to examine the effect of ChatGPT usage on student productivity.

a. Validity test

The validity test results show that all questionnaire items have Corrected Item-Total Correlation values greater than 0.30. Therefore, all items are declared valid and suitable for use.

b. Reliability test

Reliability testing using Cronbach's Alpha yielded values of 0.86 for the ChatGPT usage variable and 0.88 for the student productivity variable. These values exceed the threshold of 0.70, indicating that the instruments are reliable.

Table 4. Reliability Test Results

Variable	Cronbach's Alpha	Description
ChatGPT usage	0.86	Reliable
Student productivity	0.88	Reliable

c. Simple linear regression analysis

The regression analysis results show a positive regression coefficient of 0.642. This indicates that each one-unit increase in ChatGPT usage leads to an increase in student productivity of 0.642 units.

d. Hypothesis testing (t-test)

The calculated t-value is 8.94 with a significance value of 0.000 (< 0.05). Thus, hypothesis H_1 is accepted, indicating that ChatGPT usage has a significant effect on student productivity.

Table 5. Regression Analysis Results

Variable	Coefficient	t-value	Sig.
ChatGPT usage	0.642	8.94	0.000

3.3 Discussion

The results of this study indicate that ChatGPT usage has a positive and significant effect on the productivity of students in the Information Technology Study Program at Politeknik Negeri Tanah Laut. These findings suggest that ChatGPT functions as an academic support tool capable of improving task efficiency and effectiveness. This result is consistent with the findings of Noy and Zhang, who reported that the use of generative AI significantly increases productivity through faster task completion and improved output quality in knowledge-based work [16]. Similarly, Brynjolfsson et al. found that generative AI technologies have a positive productivity impact, particularly for users who are still in the competence development stage [17].

Productivity improvement in this study is particularly evident in efficiency and timeliness of task completion. Students reported that ChatGPT helped them understand task instructions and structure problem-solving approaches, thereby reducing task completion time. This finding aligns with the systematic literature review conducted by Labadze et al., which concluded that chatbot-based AI can reduce students' initial cognitive load in learning and academic task completion [18]. Kasneci et al. further emphasized that large language models such as ChatGPT effectively serve as cognitive scaffolds that help users understand problems before proceeding to more complex solution stages [19].

However, the results indicate that task quality is not entirely dependent on ChatGPT. Students still need to verify, modify, and further develop ChatGPT outputs to ensure alignment with task contexts and learning objectives. This finding reinforces the view of Imran and Almusharraf, who stated that ChatGPT functions optimally as a writing assistant and learning support tool rather than a substitute for students' critical thinking processes [20]. Bringula's research in programming courses also demonstrated that although ChatGPT assists in

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code writing and explanation, its outputs still require evaluation due to potential logical errors or overly generalized solutions [21].

Regarding learning independence, the use of ChatGPT in this study shows mixed effects. Some students reported increased independence due to improved conceptual understanding and clearer problem-solving directions, while others acknowledged the potential for dependency if ChatGPT is used excessively. This result is consistent with the findings of Bin-Nashwan et al., who highlighted the dilemma between efficiency gains and the risk of declining academic integrity in higher education ChatGPT usage [22]. Cotton et al. also emphasized that without proper supervision and assessment design, ChatGPT usage may encourage passive learning behaviors and student dependency on AI systems [23]. Therefore, AI literacy and the reinforcement of academic ethics are essential factors in maximizing the benefits of ChatGPT without compromising learning independence.

Compared to previous studies, this research contributes novel insights by focusing on vocational students in the Information Technology field. Most prior studies emphasized professional contexts [16], [17] or higher education in general [18], [20], whereas this study highlights the polytechnic environment, which is practice-oriented, project-based, and competency-driven. This context is important because productivity among IT students is measured not only by task completion speed but also by the quality of technical solutions and job readiness. Thus, this study addresses a research gap regarding the impact of ChatGPT on the productivity of vocational IT students.

Overall, this study confirms that ChatGPT can serve as an effective tool for enhancing the productivity of Information Technology students when used wisely and purposefully. These findings support UNESCO and OECD guidelines, which emphasize that the use of generative AI in education should be human-centered, transparent, and supported by appropriate policies and literacy frameworks [24], [25]. The results of this study are expected to serve as a foundation for institutions in formulating policies for productive, ethical, and learning-oriented utilization of ChatGPT to improve educational quality and graduate competencies.

4. Conclusion

This study concludes that the use of ChatGPT has a positive and significant effect on the productivity of students in the Information Technology Study Program at Politeknik Negeri Tanah Laut. This effect is reflected in improvements in task efficiency, timeliness of completion, and students' ability to understand instructions and formulate initial solutions to academic problems. ChatGPT has been shown to function as an effective academic support tool in facilitating learning activities and task completion, particularly in report writing and programming, which are core characteristics of the Information Technology discipline. However, this study also emphasizes that ChatGPT cannot replace students' roles in critical thinking and academic decision-making processes, as the quality of task outcomes remains highly dependent on students' abilities to verify, evaluate, and further develop the outputs generated by the system. From the perspective of learning independence, the use of ChatGPT demonstrates an ambivalent impact. On the one hand, ChatGPT can enhance student independence by supporting conceptual understanding and accelerating the learning process; on the other hand, excessive reliance may lead to dependency if its use is not accompanied by adequate artificial intelligence literacy and academic supervision. This finding indicates that ChatGPT utilization should be guided and regulated to ensure that it supports learning objectives without compromising academic integrity or the quality of the learning process. This study has several limitations, including the use of perception-based data collected through questionnaires, the limited scope of research focused on a single study program, and the absence of a detailed distinction regarding types of ChatGPT usage across courses or levels of task complexity. Therefore, future research is recommended to involve a broader research scope, employ more diverse methodological approaches, and incorporate additional variables to obtain a more comprehensive understanding of the impact of ChatGPT in higher education.

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