The Impact of AI-Based Media on Learning Effectiveness: Evidence from the Faculty of Mathematics and Natural Sciences, Universitas PGRI Pontianak

M. Qadafi Khairuzzaman[1*], Baharuddin, J.H.[2]

[1]InformaticsStudy Program, Faculty of Mathematics, Natural Scinces, and Technology, Universitas PGRI Pontianak, Jl. Ampera No.88 Pontianak, Kalimantan Barat.
[2]Information Systems Study Program, Faculty of Mathematics, Natural Scinces, and Technology, Universitas PGRI Pontianak, Jl. Ampera No.88 Pontianak, Kalimantan Barat.
*Corresponding Author: m.qadafi.k@gmail.com

Abstract. Artificial Intelligence (AI) is frequently used to drive digital transformation in the learning process at universities. The use of AI-based media enables adaptive learning, automated assessment, and the use of virtual assistants that support flexible access to information. However, the implementation of AI still faces several challenges, such as suboptimal use by faculty and students, limited knowledge and experience regarding the impact of AI on learning effectiveness, and the potential for dependency on AI. Given these issues, this study aims to analyze the impact of AI-based media on the effectiveness of the learning process, faculty and student engagement, and improvements in learning outcomes. To obtain the desired data, this study employed a quantitative research approach using a survey method that involved faculty members and students as respondents. Data were collected through questionnaires to measure the extent of AI use and its impact on learning effectiveness, observations to examine the relationship between teaching and learning outcomes, and written interviews to elicit respondents' views on the impact of AI utilization in educational media. An analysis of learning outcomes was conducted to examine the positive and negative effects of the differences before and after the use of AI-based media. The results or findings of this study can also serve as a basis for policy-making regarding the integration of AI technology to improve the quality of learning in the digital age.
Keywords: Artificial Intelligence; Learning Effectiveness; Learning Outcomes

How to cite (in APA style):
Khairuzzaman, M.Q., & baharuddin, J.H. (2026). The Impact of AI-Based Media on Learning Effectiveness: Evidence from the Faculty of Mathematics and Natural Sciences, Universitas PGRI Pontianak. *Proceeding of IJC-MaSTEd*, 1(1), 276-291

DOI: https://doi.org/10.31571/ijcmasted.v1i1.1124

1. Introduction

The use of Artificial Intelligence (AI) in education has become an increasingly relevant topic in recent years, particularly with the advancement of digital technology and the need for more adaptive and personalized learning in the context of modern education (Sitorus & Murti, 2024). AI can be defined as a form of machine capability that mimics human intelligence, including the ability to learn, solve problems, make decisions, and interact with the social environment (Zakiyah, 2024).

Digital learning tools integrated with AI capabilities are flexible and user-friendly, and will accelerate the transformation of knowledge. The use and implementation of digital tools are believed to support more effective learning and teaching that is more engaging for students and faculty members (Hakeu, 2023). There are quite a few types of AI commonly used to support

education, ranging from the creation of learning materials to educational videos. Some examples of AI that can support learning include AI chatbots, Large Language Models (LLMs), design/images/comics, presentations, audio, and video (Valino, 2024). It is strongly encouraged that faculty and students be prepared to keep pace with and apply the technological advancements taking place in the field of education in today's digital age to support a more interactive and adaptive learning process.

The implementation of AI-based media in the learning process within a university setting, particularly at the MIPATEK Faculty of UPGRI Pontianak, requires some form of assessment to determine a comprehensive understanding of its impact on learning effectiveness. The use of AI by faculty and students is considered to be uneven and has not yet been systematically measured, raising questions such as: 1). What is the level of AI-based media utilization by faculty and students?, 2). What is the level of learning process effectiveness?, 3). Is there a significant relationship between AI usage and learning effectiveness?, and 4). What are the positive and negative impacts of utilizing AI-based media in learning?.

The positive impacts of using AI in learning mechanisms include making learning more efficient and personalized, driving innovation across various aspects of education, solving problems and providing accurate answers, enhancing students' independent learning, and helping to maximize the learning process (Tasya, 2025).

In addition to positive impacts, the trend toward using AI-powered tools in the learning process also carries potential negative consequences, such as technological dependency, a decline in critical thinking skills, and the risk of plagiarism, which require further in-depth analysis (Sitorus & David, 2024). These include reduced independence in seeking and processing information, data privacy concerns, and technical challenges that can hinder the learning process (Princess, 2023). The use of Artificial Intelligence in learning has the potential to lower academic quality, such as weakening critical thinking skills, increasing student dependence, decreasing interest in reading, reducing academic integrity, and potentially diminishing faculty creativity while posing the risk of producing inaccurate information (Musliha, 2025).

Given the positive and negative impacts, oversight is necessary to ensure that AI is used wisely and responsibly to avoid unintended consequences. Therefore, a concrete analysis is needed to measure the impact of AI-based media on learning effectiveness, particularly in terms of students' understanding of the material, engagement, and learning outcomes. Based on these issues, this study aims to analyze the impact of AI-based media on the effectiveness of the learning process, using a case study at the Faculty of MIPATEK, UPGRI Pontianak.

2. Method

Research Design

Based on the case study presented, in order to provide structured results, systematic procedures, and targeted guidance in collecting, processing, and analyzing data—with the aim of producing valid, objective, and accountable findings—this study employs a quantitative approach using a survey method. This method was chosen because it can comprehensively describe trends in respondents' perceptions based on the collected numerical data (Chaerani, 2025). The quantitative approach was selected because it allows for the objective measurement of research variables through numerical data and the testing of relationships between variables based on statistical

analysis. The survey method was used to obtain data directly from a relatively large number of respondents so that empirical conditions could be described in a systematic and measurable manner (Dinita, 2026).

The steps used to obtain valid findings in accordance with the selected case studies were as follows:

1. Data Collection
   Data collection was conducted through observation to directly observe learning activities utilizing AI-based media, written interviews, and the distribution of questionnaires to respondents—specifically faculty members and students selected as the research sample—in order to directly obtain data related to the variables under study.
2. Data Processing
   The collected data was then examined, coded, and entered into software such as Excel to facilitate further analysis.
3. Data Analysis
   The data was analyzed through validity and reliability tests, regression analysis, and hypothesis testing to determine the relationships or influences between variables.
4. Data Presentation
   The results of the analysis are presented in the form of tables, graphs, or diagrams accompanied by narrative explanations to make them easy to understand and interpret.
5. Drawing Conclusions
   Conclusions are formulated based on the results of the data analysis to address the research questions and objectives, and are supplemented with relevant recommendations.

Data Collection Methods

To obtain the desired data that will influence data processing, data analysis, and data presentation, this study employs the following data collection methods:

1. Secondary Data
   Secondary data was collected directly from the research subjects through observation, written interviews, and the distribution of questionnaires.
2. Primary Data
   Primary data was obtained from previously published research journals to provide references and solutions for the future in accordance with the selected case studies.

Population and Sample

As crucial methodological elements for determining the validity, reliability, and generalizability of research results, the roles of the population and sample are essential. The population involved in this study consists of faculty members and students within the MIPATEK environment at PGRI University of Pontianak, specifically within the Information Technology Education, Information Systems, and Computer Science programs. To determine the sample from this population, the researcher used a specific purposive sampling method targeting those considered active and knowledgeable in the use of AI-based media in learning, combined with stratified random sampling

to ensure representation of faculty members and students from each program (Hanifah &, Novebri. 2025). A total of 30 participants were selected, comprising 10 faculty members and 20 students.

Research Variables

In quantitative research in the field of Educational Technology, variables play a crucial role as tools for explaining the relationships between the phenomena under study. Variables serve as the foundation for measurement, analysis, and the drawing of research conclusions. This study employs two main variables: the independent variable and the dependent variable, which are examined within the context of Educational Technology.

1. Independent Variable (X)
   The Use of Artificial Intelligence-Based Media
   Formula: $X = \frac{X_i}{n}$
   Notes:
   X = AI adoption variable score
   Xi = score for each indicator
   n = number of indicators
2. Dependent Variable (Y)
   Effectiveness of the Learning Process
   Formula: $X = \frac{Y_i}{n}$
   Notes:
   X = score for the learning effectiveness variable
   Xi = score for each indicator
   n = number of indicators

3. Results and Discussion

Description of Research Data

This study was conducted among faculty members and students at the Faculty of MIPATEK, UPGRI Pontianak, with a total of 30 respondents, comprising 10 faculty members and 20 students. The respondents were from various academic programs, primarily Computer Science, Information Systems, and Information and Computer Technology Education, and were actively participating in digital-based learning processes. Based on the data collected, it was found that the majority of students have used Artificial Intelligence-based tools in their learning activities.In terms of frequency of use, 70% of respondents use AI regularly to complete academic assignments, while the remaining 30% use AI on a situational basis. The most commonly used AI tools include ChatGPT, Canva, Grammarly, and other generative AI-based tools.

Description of Research Variables

The description of the research variables aims to provide an overview of the level of utilization of Artificial Intelligence-based media and the perceived effectiveness of the learning process among students, based on the results of the questionnaire data analysis. The analysis was conducted using a Likert scale with a range of 1 to 5, allowing the results to be categorized into low, moderate, and high levels.

1. Utilization of AI-Based Media (Variable X)

Based on the results of the questionnaire data analysis, the average score for the AI-based media utilization variable was 3.84, which falls into the high category. This score indicates that students at the Faculty of MIPATEK, UPGRI Pontianak, have utilized AI technology to support their learning activities.

Judging from the percentage distribution of respondents' answers, the majority of students responded in the "agree" and "strongly agree" categories, indicating that the use of AI has become a habit in daily academic activities. This shows that AI is not only used incidentally but has been integrated into the learning process.

The indicators used in this variable include:

a. Ease of Use of AI
   Students find AI-based tools easy to access and use, whether via computers or smartphones. A simple interface and quick response times are the main factors driving the widespread use of AI.
b. Frequency of AI Use
   The frequency of AI use is relatively high, with students tending to use AI regularly, particularly when completing assignments, searching for references, and gaining a better understanding of course material.
c. Purpose of AI Use
   The use of AI is not limited to information retrieval but also extends to drafting reports, summarizing course material, and helping to answer academic questions quickly and efficiently.

Overall, this indicates that the use of AI has become an integral part of students' academic activities and plays a role in supporting technology-enhanced learning processes.

2. Effectiveness of the Learning Process (Variable Y)

Based on the results of the data analysis, the mean value for the learning process effectiveness variable was 3.79, which also falls into the high category. This indicates that, in general, students feel that the learning process they have undergone has been effective.

The percentage distribution of responses shows a dominance in the "agree" category, indicating that the majority of students perceive an improvement in learning quality after utilizing AI-based media.

The indicators used in the learning effectiveness variable include:

a. Understanding of course material
   Students find it easier to understand course material with the help of AI, particularly in obtaining simpler and faster additional explanations.
b. Active participation in learning
   The use of AI encourages students to be more active in seeking information and participating in the learning process independently.
c. Learning time efficiency
   AI helps students save time when searching for references and completing assignments, making the learning process more efficient.
d. Learning outcomes

The use of AI contributes to improved learning outcomes, both in terms of conceptual understanding and the completion of academic assignments.

Thus, it can be concluded that the use of AI-based media contributes positively to the effectiveness of the learning process. Students feel that the use of this technology enhances the quality of learning in terms of comprehension, engagement, and efficiency.

Research Instrument Validation

Research instrument validation was conducted to ensure that the measurement tools used were valid and reliable. The validation process included validity testing to assess the accuracy of the survey items, as well as reliability testing using Cronbach's Alpha to evaluate the instrument's consistency, thereby ensuring that the data collected was suitable for further analysis.

1. Validation Test

   Validity testing is a form of measurement process designed to determine how accurate and precise a research instrument is based on the results of questionnaire data analysis—in measuring what it is intended to measure. The purpose of validity testing is to ensure that the data obtained accurately reflect reality. The validity tests conducted consist of Test X on the variable of AI-based media utilization and Test Y on the variable of learning effectiveness (Y).

   a. Validity Test for Variable X

      In the variable validity test, variable X comprises two measured variables: the positive and negative impacts of AI-based media on learning effectiveness. The results of the variable validity test for variable X are presented in the following breakdown.

Table 1 Results of the Validity Test for Variable X The Positive Impact of AI Media Useon Learning Effectiveness

Calculation Notes	Variable X (Question)									
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
Calculated R	0,566	0,467	0,364	0,690	0,502	0,477	0,666	0,293	0,679	0,483
Table R	0,361	0,361	0,361	0,361	0,361	0,361	0,361	0,361	0,361	0,361
Notes	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Invalid	Valid	Valid
Variance	0,576	0,654	0,599	0,621	0,626	0,654	0,737	0,489	0,585	0,723

Based on the results of the validity test for variable X regarding the positive impact of AI media use on learning effectiveness, which yielded a value of 90%, the variable is deemed valid. This is supported by the fact that the mean calculated R-value is greater than the table R-value, in accordance with the data specified in the critical value table at a significance level of 0.05/5%.

Table 2 Results of the Validity Test for Variable X The Negative Impact of AI Media Useon Learning Effectiveness

Calculation Notes	Variable X (Question)									
	X1	**X2**	**X3**	**X4**	**X5**	**X6**	**X7**	**X8**	**X9**	**X10**
Calculated R	0,432	0,533	0,485	0,624	0,487	0,472	0,667	0,600	0,368	0,628
Table R	0,361	0,361	0,361	0,361	0,361	0,361	0,361	0,361	0,361	0,361

Calculation Notes	Variable X (Question)									
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
Notes	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid	Valid
Variance	0,230	0,392	0,507	0,317	0,424	0,317	0,562	0,386	0,309	0,254

The results of the validity test for variable X regarding the negative impact of AI media use on learning effectiveness yielded a value of 100%, indicating that the variable is valid. This is evidenced by the fact that the mean calculated R-value is greater than the table R-value, in accordance with the data specified in the critical value table at a significance level of 0.05/5%.

b. Results of the Validity Test for Variable Y
The validity test for variable Y focused on the effectiveness of the learning process. The results of the validity test for variable Y are presented in the following breakdown:

Table 3 Results of the Validity Test for Variable Y Effectiveness of the Learning Process

Calculation Notes	Variable Y (Question)									
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Calculated R	0,577	0,539	0,224	0,655	0,717	0,355	0,584	0,698	0,570	0,613
Table R	0,361	0,361	0,361	0,361	0,361	0,361	0,361	0,361	0,361	0,361
Notes	Valid	Valid	Invalid	Valid	Valid	Invalid	Valid	Valid	Valid	Valid
Variance	0,355	0,461	0,409	0,351	0,409	0,248	0,616	0,464	0,372	0,493

Based on the results of the validity test for variable Y regarding the impact of AI media use on the effectiveness of the learning process, a value of 80% was obtained, indicating that the variable is valid. This is supported by the fact that the mean calculated R-value is greater than the table R-value, in accordance with the data specified in the critical value table at a significance level of 0.05/5%.

2. Reliability Test

A reliability test is a statistical procedure used to measure the consistency, stability, or reliability of a research instrument (such as a questionnaire) when used repeatedly, ensuring that measurement results remain the same or similar. An instrument is considered reliable if respondents' answers are consistent over time, typically using a Cronbach's Alpha metric >0.7. The following are the results of the reliability test for the AI-based media utilization variable (X) and the learning effectiveness variable (Y).

Table 4 Results of the Reliability Test for Variable X and Variable Y

Variable	Area Value	Alpha Value	Description
X Positive Impact	>0,7	0,702	Reliable
X Negative Impact	>0,7	0,714	Reliable
Y Learning Effectiveness	>0,7	0,751	Reliable

The results of the reliability test using the Cronbach's Alpha method indicate that the Cronbach's Alpha values for the variables of AI-based media utilization (X) and learning effectiveness (Y) are

above the minimum threshold of 0.7. These results indicate that the research instrument has a good level of internal consistency, where each statement item yields stable and reliable results. Analytically, high reliability values also indicate that respondents provided relatively consistent answers to each measured indicator. From these reliability test results, it can be concluded that the entire research instrument is reliable and suitable for further analysis.

Data Analysis

Data analysis was conducted to identify patterns, relationships between variables, and the basis for accurate decision-making. The data analysis methods used included the Normality Test, Simple Linear Regression Analysis, the t-test (Significance), and the Coefficient of Determination (R^2).

1. Normality Test

A normality test is conducted to determine whether the research data is normally distributed or not, as a prerequisite for regression analysis. Based on the results of the Kolmogorov-Smirnov test, a significance value greater than 0.05 was obtained. The results of the normality test indicate that the significance value of 0.200 > 0.05, so the data in this study is normally distributed and can proceed to regression analysis.

2. Simple Linear Regression Analysis

Simple linear regression analysis is used to determine the extent of the influence of AI usage variables on learning effectiveness. Based on the data analysis results, the following regression equation was obtained:Y = 1,897 + 0,492X

Based on the results of the analysis using the Simple Linear Regression method, the regression equation obtained is Y = 1.897 + 0.492X. The regression coefficient of 0.492 is positive, indicating that the use of AI has a positive effect on learning effectiveness.

This means that every increase in the use of AI-based media will be accompanied by an increase in the effectiveness of the learning process. Thus, the higher the level of AI utilization, the better the learning effectiveness achieved.

3. t-Test (Significance)

A t-test was conducted to determine whether the variable of AI utilization has a significant effect on learning effectiveness. Based on the test results, a significance value of less than 0.05 was obtained.The t-test results showed a significance value of 0.000 < 0.05 with a t-test value of 0.506, so it can be concluded that the use of AI has a significant effect on learning effectiveness.

4. Coefficient of Determination (R^2)

The coefficient of determination is used to determine the extent to which the AI utilization variable contributes to explaining the variation in learning effectiveness. Based on the analysis results, an R^2 value of 0.55 was obtained, indicating that 55% of the variation in learning effectiveness can be explained by AI utilization, while 45% is directly influenced by the learning system itself.Analytically, this indicates that although AI plays a significant role in improving learning effectiveness, other factors such as teaching methods, learning motivation, and the academic environment also influence learning outcomes.

Discussion

In line with the objectives of this study, this section will discuss the positive and negative impacts on learning effectiveness. It will also address critical analysis and connections to previous research, with the aim of reinforcing the findings and providing a point of comparison for the current study.

1. The Positive Impact of AI-Based Media on the Effectiveness of the Learning Process
   The results of the study indicate that the use of AI-based media has various positive effects on the learning process, for both students and instructors. These effects can be summarized as follows:

Table 5 Positive Impact of AI-Based Media on Learning Effectiveness

For Faculty Members	For Students
1. Assisting in the development of learning materials Instructors can use AI to create teaching materials, modules, and learning content more quickly and systematically. 2. Enhancing innovation in teaching methods AI encourages instructors to develop more interactive and technology-based learning methods. 3. Efficiency in learning assessment AI can be used to assist in the creation of questions, quizzes, and preliminary assessments of student assignments. 4. Improving the quality of content delivery Instructors can use AI to enrich examples, illustrations, and explanations of course material to make them easier to understand. 5. Supporting adaptive learning AI allows instructors to tailor course material to the diverse needs and abilities of students.	1. Improving learning efficiency Students can complete assignments and find references more quickly with the help of AI. 2. Facilitating access to information AI allows students to quickly access a variety of learning resources without being limited by time or location. 3. Enhancing understanding of course material Explanations provided by AI are simpler, more interactive, and can be tailored to students' needs. 4. Encouraging self-directed learning Students become more active in exploring material on their own without relying entirely on instructors. 5. Supporting the completion of academic assignments AI assists with creating summaries, writing reports, and developing initial ideas or concepts for assignments.

Overall, the use of AI in education demonstrates an improvement in the quality of the teaching and learning process in the field of Educational Technology. Instructors receive support in enhancing the effectiveness and innovation of their teaching, while students benefit from greater ease in learning. This indicates that AI serves as a supportive tool capable of creating a more efficient, adaptive, and interactive learning process.

2. The Negative Impact of AI-Based Media on the Effectiveness of the Learning Process

In addition to the positive impacts, the study's findings also indicate that the use of AI-based media has a number of negative impacts that need to be addressed and anticipated. These impacts are evident among students and faculty members as follows:

Table 6 Negative Impacts of AI-Based Media Use on Learning Effectiveness

For Faculty Members	For Students
1. Decline in creativity in teaching Reliance on AI can reduce instructors' initiative in developing innovative teaching methods.	1. Declining critical thinking skills Reliance on instant answers from AI leads students to accept information without in-depth analysis.
2. Difficulty in assessing the authenticity of assignments Instructors face challenges in distinguishing between students' independent work and work assisted by AI.	2. Overreliance on technology Students prefer using AI over seeking original reference sources such as books or scientific journals.
3. Decline in academic interaction Students' use of AI may reduce direct discussion between instructors and students during the learning process.	3. Declining interest in reading and scientific exploration Learning habits become instantaneous, reducing students' efforts to understand the material comprehensively.
4. Reliance on technology in developing course materials Instructors tend to use AI as the primary source without further development or validation.	4. Risk of academic integrity violations Using AI to complete assignments without adequate understanding can lead to plagiarism or an inability to explain one's own work.
5. Potential for the dissemination of inaccurate information AI-generated materials may not align with the curriculum or academic standards if not properly verified.	5. Potential for misunderstanding the material Information provided by AI is not always specific or contextually appropriate for a particular academic field, which can lead to misconceptions.

Overall, the negative impacts of AI use indicate that the application of technology in educational technology must be balanced with robust controls, digital literacy, and academic ethics. Without proper management, the use of AI has the potential to undermine the quality of learning, both in terms of faculty professionalism and student cognitive development.

3. Critical Analysis

The research findings indicate that the use of Artificial Intelligence-based media has both positive and negative effects on learning effectiveness. Critically, these findings confirm that AI acts as an enabler of efficiency and access to knowledge, yet simultaneously has the potential to become a risk factor that diminishes the quality of cognitive processes if not managed properly. Therefore, the resulting learning effectiveness is not solely determined by the presence of AI, but rather by how AI is used, controlled, and integrated into learning practices.

A summary of the positive and negative impacts is provided in the following table:

Table 7 Summary of Positive and Negative Impacts

No	Description	Impact	
		Positive	Negative
1	Efficiency vs. Depth of	AI speeds up information	This may reduce the depth of

No	Description	Impact	
		Positive	Negative
	Understanding	retrieval and task completion	analysis. Short-term effectiveness increases (tasks are completed quickly), but long-term understanding may suffer if students do not engage in verification and reflection.
2	Access to Knowledge vs. Information Validity	AI provides broad access to a wide range of sources.	Not all information is accurate or academically relevant. Without good information literacy, students and faculty members risk using content that lacks validity.
3	Independent Learning vs. Reliance on Technology	AI promotes self-directed learning.	AI can also foster dependency if used as an "instant answer." The sense of independence it creates can be illusory if not accompanied by critical thinking skills.
4	Innovation in Teaching vs. Declining Creativity	For lecturers, AI accelerates the development of materials and methods.	Overuse can hinder the exploration of original ideas and context-specific pedagogical innovations.
5	Academic Productivity vs. Academic Integrity	For AI students, this boosts productivity (tasks are completed quickly).	Excessive use increases the risk of ethical violations such as disguised plagiarism and an inability to explain one's own work.

Implications for Learning Effectiveness

Within the framework of Educational Technology, the effectiveness of learning is measured not only by speed and final outcomes, but also by:

1) Quality of Conceptual Understanding
   The quality of conceptual understanding refers to students' ability to deeply comprehend and apply course material, supported by the instructor's role in presenting concepts clearly, systematically, and contextually.
2) Critical and Analytical Thinking Skills
   Critical and analytical thinking skills refer to students' ability to evaluate information and solve problems logically, with faculty guidance in directing the analysis process and strengthening arguments.
3) Active Participation and Learning Interaction
   Active participation and learning interaction refer to the level of student engagement in the learning process through discussion and collaboration, facilitated by instructors through interactive and participatory teaching methods.
4) Academic Integrity
   Academic integrity refers to students' honesty and sense of responsibility in completing assignments, fostered through instructors' oversight and enforcement of academic ethics.

Research findings indicate that AI enhances efficiency and access, but does not automatically improve higher-order cognitive skills (analysis, evaluation, and creation). Thus, AI serves as a complementary (supportive) tool rather than a substitute in the learning process.

a. Solutions and Strategic Recommendations

To ensure that AI is used more effectively in the future, action is needed at three levels: students, faculty, and institutions.

Table 8 Solutions and Strategic Recommendations

Objectives	Solutions
1. Student Level	1. Improving AI and information literacy: equipping students with the ability to evaluate the accuracy, bias, and relevance of AI outputs. 2. Implementing AI-assisted learning, not AI-dependent learning: AI is used as a tool (for brainstorming, clarification), not as a source of final answers. 3. Strengthening academic ethics: the obligation to disclose the use of AI and the ability to explain one's own work.
2. Faculty Level	1. Process-oriented assignment design: assessment focuses not only on the final product but also on the thought process (logbooks, drafts, reflections). 2. Integration of AI into active learning strategies: for example, prompt-based discussions, critiques of AI outputs, and comparative analysis with scholarly sources. 3. Content curation and validation: Instructors remain the gatekeepers of material quality, ensuring alignment with the curriculum and academic discipline.
3. Institutional Level	1. Development of AI usage policies: clear guidelines regarding the limits, ethics, and standards for using AI in education. 2. Ongoing training: enhancing the competencies of faculty and students in utilizing AI in a pedagogically sound and ethical manner. 3. Strengthening the digital ecosystem: providing platforms, plagiarism detection tools, and official learning resources to ensure balanced use of AI.

b. Recommended Implementation Model

The recommended approach is "Human-AI Collaborative Learning," which is:

1) AI is used to enhance capabilities (accelerate, enrich),
2) Faculty and students retain cognitive and ethical control (analysis, evaluation, decision-making).

With this model, AI does not replace the thinking process, but rather expands learning capacity in a targeted manner.In conclusion, the use of AI holds great potential for enhancing learning effectiveness, but it also carries the risk of diminishing cognitive quality and academic integrity if used without proper oversight. The key to success regarding the impact of AI-based media on the learning process lies in its wise, structured, and literacy-based use, so that AI truly becomes a tool that supports the creation of effective, adaptive, and sustainable learning.

4. Relationship to Previous Research

Previous research is used to establish a theoretical foundation, identify research gaps, compare findings, strengthen validity, and provide broader recommendations and innovative research insights, thereby ensuring that the current study makes a clear scientific contribution.

Table 9 Relationship to Previous Research

Author	Positive Impact	Negative Impact	Solution
Kamil.I. 2025 The Impact of Artificial Intelligence on College Students	AI makes learning materials more accessible, supports adaptive learning tailored to individual learning styles, and helps students manage their time and plan for the future.	The use of AI has the potential to pose risks of data breaches and privacy violations, increase students' reliance on technology at the expense of independent thinking, and shift the role of instructors as the primary facilitators of learning.	The use of AI should be optimized for accessible and adaptive learning that continues to foster independence, with robust privacy policies, safeguards to prevent dependency, a strengthened role for instructors, and support for digital literacy, ethics, and process-based assessment.
Tittahira. A & Usiono. 2025 The Impact of Artificial Intelligence on College Students: An Analysis of AI Use in Higher Education	AI improves time efficiency and reduces stress, supports adaptive learning and progress tracking, and expands access to global insights, enabling students to develop their academic and non-academic skills to the fullest	The use of AI carries the risk of fostering a dependency that undermines critical thinking and independence, increases the potential for plagiarism, widens the digital divide due to limited access, and threatens students' privacy and data security if not properly managed.	The use of AI should be optimized to support adaptive learning and efficiency, through the promotion of digital literacy, ethical oversight, equitable access, and data protection policies to prevent dependency, plagiarism, and security risks.
Santoso.M.A. 2026 Analysis of the Use of AI Technology as a Learning Resource for Students	The use of AI as a learning tool helps students understand course material, speed up information searches, and complete assignments more efficiently,	The use of AI has the potential to raise issues regarding the accuracy and validity of information, as well as pose academic ethical risks; therefore, without proper	The use of AI should be guided as a learning tool that supports analysis and understanding, through the implementation of critical-thinking-based assignments, the

Author	Positive Impact	Negative Impact	Solution
	especially for students with strong digital literacy skills.	guidance, it may compromise the quality of learning and deep understanding.	requirement to verify sources, the reinforcement of academic ethics, and faculty guidance to ensure that students continue to think independently and do not lose their natural intelligence.
Sihombing.G.C. 2026 Analysis of the Impact of Excessive Use of Chatbot-Based Artificial Intelligence on Students' Learning Behavior	The use of AI significantly improves students' understanding of the material, time efficiency, ease of access to references, and motivation to learn.	The use of AI has the potential to diminish critical thinking skills and independence, increase reliance on technology, and pose risks of academic misconduct.	The use of AI chatbots should be guided as a learning tool for initial exploration and discussion, with an emphasis on tasks involving analysis, originality, and source verification, and supported by institutional policies and faculty guidance to ensure that students maintain their critical thinking skills and natural intelligence.

Research Implications

Based on the results of research analyzing the impact of artificial intelligence-based media on the effectiveness of the learning process, several important implications have been identified regarding the roles of instructors, students, and educational institutions. These implications are presented in the following table:

Table 10 Research Implications

No	Related Parties	Key Implications	Explanation	Recommended Actions
1	Faculty Level	1. Development of AI-based learning strategies	Instructors need to integrate AI into the learning process in a targeted manner so that it not only improves efficiency but also maintains the quality of students' understanding and critical thinking	1. Designing learning methods based on analysis and discussion 2. Using AI as a tool, not a replacement 3. Developing process-based assignments

No	Related Parties	Key Implications	Explanation	Recommended Actions
		2. Enhancing learning innovation	The use of AI encourages instructors to create more interactive and adaptive learning experiences in line with technological advancements	1. Developing digital learning materials 2. Using active learning approaches 3. Integrating AI-based case studies
2	Student Level	1. Improving digital literacy and AI	Students need to understand how to use AI responsibly, including the ability to evaluate information generated by AI	1. Improving information analysis skills 2. Verifying AI results 3. Using AI as a learning tool
		2. Strengthening independent learning	AI can encourage students to learn independently, but this must be balanced with academic responsibility	1. Developing critical thinking skills 2. Not relying entirely on AI 3. Enhancing the exploration of scientific sources
3	Institutional Level	1. Regulation on the use of AI	Institutions need to establish clear rules regarding the use of AI so as not to cause abuse in learning	1. Develop guidelines for the use of AI 2. Establish technology-based academic ethical standards 3. Controlling the use of AI in academic tasks
		2. Technology-Based Learning Policy Development	Institutions need to support digital transformation in learning through adaptive policies	1. Provide training for lecturers and students 2. Developing a technology-based learning system 3. Improving digital facilities
		3. Strengthening academic integrity	The use of AI has the potential to cause academic misconduct if not properly supervised	1. Develop a plagiarism detection system 2. Promote ethics regarding AI usage 3. Impose clear academic sanctions

4. Conclusion

Based on the results of research, the use of Artificial Intelligence (AI) - based media in the learning process at the Faculty of MIPATEK UPGRI Pontianak is in the high category and is proven to have a positive and significant influence on the effectiveness of learning, with a contribution of 55% (R2 = 0.55) and a significance value of 0.000 < 0.05 to the results of the analysis of the positive and negative impact of the use of AI media on the effectiveness of the learning process. The results of research have shown that the use of AI media in the learning process can improve material understanding, learning efficiency, activeness, and student learning outcomes. However, the use of

AI also has a negative impact in the form of a decrease in critical thinking skills, increased dependence on technology, and the risk of violation of academic ethics if not properly controlled. Therefore, it can be concluded that the use of AI media in the learning process cannot be positioned as a substitute, but rather as a learning support tool that must be integrated wisely, structured, and based on digital literacy and pedagogical supervision, in order to improve the quality of learning without reducing the cognitive ability and academic integrity of students.

References

Chaerani, A. (2025). Analysis of PGSD students ' perceptions of the use of Artificial Intelligence in the learning process. *Journal of Education and Learning Technology*, Vol.3, No.2, pp.30-35, e-ISSN:2986-5565.

Dinita, A. (2026). The Effect of The Use of Artificial Intelligence (AI) On The Learning Effectiveness Of Students Of The 2024 Batch Of Information Science And Library, Airlangga University. *Student Journal of Information Engineering*, Vol.10, No.1, 1132-1139, ISSN: 2598-828X

Hakeu. (2023). Digital Learning Media Workshop for teachers with AI (Artificial Intelligence) Technology. *Journal of Community Service*, Vol.2, No.2, pp. 1-14, t, ISSN: 2963-9956.

Hanifah, U., & Novebri. (2025). Dependence of the use of AI applications in the effectiveness of learning in students of Islamic Education Management. *Journal of Management and Islamic Religious Education*, Vol.3, No.1, pp.265-273, p-ISSN: 3031-8416.

Kamil. (2025). The effect of Artificial intelligence on college students. *Journal of Economic and Digital Business*, Vol.2, No.1, pp.33-41, ISSN: 3123-5492.

Musliha. (2025). Dynamics Of The Use Of Artificial Intelligence (Ai) In The Learning Process In Higher Education (Case Study Of Zainul Hasan Genggong Islamic University And Panca Marga University). *Journal Of Learning Technology Indonesia*, Vol.15. No.2, pp. 142-158, ISSN: 2615-2797.

Princess, V.A. (2023). The role of Artificial Intelligence in the learning process of students at the State University of Surabaya. *Proceedings of the National Seminar (UNESA)*, pp. 615-630, ISSN 1234-5678.

Sihombing, G.C. (2026). Analysis of The Impact of Excessive Use of Chatbot-Based Artificial Intelligence on Student Behavior In Learning. *Journal Of Academic Media*, Vol.4, No.1, pp. 1-14, ISSN:3031-5220.

Santo, M.A. (2026). Analysis Of The Use Of AI Technology As A Reference For Student Learning. *Scientific Journal Of Educational Sciences*, Vol.9, No.1, pp.683-687, SSN: 2614-8854.

Sitorus, M., & Murti, M.D.F. (2024). Analysis of The Effect of The Use of Artificial Intelligence On Learning At Cyber University, *Journal of Computer Science, Information Systems & Information Technology (Innotech)*, Vol.1, No.2, pp.1-12, E-ISSN: 3031-1640.

Tasya, C.H. (2025). The effect of using Artificial Intelligence (Ai) on student learning motivation with Digital literacy as a Moderating variable. *Jurnal Pendidikan Ekonomi (JUPE)*, Vol.13, No.2, pp.153-165, p-ISSN : 2337-5752.

Tittahira, A., & Usiono. (2025). The Impact Of Artificial Intelligence On College Students:An Analysis Of The Use of AI In College Learning. *Scientific Journal Of Student Research* Vol.3, No.1, pp.16-20, ISSN: 3025-7964.

Valino. (2024). Student perceptions of Educational Technology towards the use of Ai in the manufacture of Learning Media. *Action Research Journal Indonesia (ARJI)*, Vol.6, No.4. pp.364-376, P-ISSN: 2774-9290.

Zakiyah, N.U. (2024). The Use of AI in Education. *MAHIRA: Journal of Arabic Studies*, Vol.4, No.1, pp.1-16, P-ISSN: 2809-8102.