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Published Online on 21 Desember 2025

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The Impact of artificial intelligence-based mathematics learning innovations on personal ethics

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Abstract

Artificial Intelligence (AI)-based learning innovations have revolutionized approaches in modern mathematics education. Behind these technological advancements are ethical dynamics that every educator should consider. Therefore, this study examines the impact of AI-based mathematics learning innovations, especially ChatGPT, on students' ethics in achieving National Education Goals in Law Number 20 of 2003 concerning the National Education System in Indonesia. The research method used is a Systematic Literature Review (SLR), which includes planning, implementation, and reporting stages. Data collection is carried out with the help of publish or perish software where google scholar is the selected database. Based on the inclusion and exclusion criteria, 21 articles were selected as data in the study. The results of the study found that there is a contradiction in the implementation of ChatGPT in mathematics learning in Indonesia with the purpose of National Education, especially students' personal ethics. These findings reflect that the use of AI in mathematics learning is not fully aligned with the goals of national education in Indonesia.

Keywords: Artificial Intelligence, Personal Ethics, Mathematics Learning Innovation.

Abstrak

Inovasi pembelajaran berbasis Artificial Intelligence (AI) telah merevolusi pendekatan dalam pendidikan matematika modern. Dibalik kemajuan teknologi tersebut, terdapat dinamika etika yang patut diperhatikan oleh setiap pendidik. Oleh karena itu, penelitian ini bertujuan untuk mengkaji dampak inovasi pembelajaran matematika berbasis AI, khususnya ChatGPT, terhadap etika pribadi siswa dikaitkan dengan pencapaian Tujuan Pendidikan Nasional pada Undang-Undang Nomor 20 Tahun 2003 tentang Sistem Pendidikan Nasional di Indonesia. Metode penelitian yang digunakan adalah Systematic Literature Review (SLR), yang mencakup tahapan perencanaan, pelaksanaan, dan pelaporan. Pengumpulan data dilakukan dengan bantuan software publish or perish dimana google scholar menjadi basis data terpilih. Berdasarkan kriteria inklusi dan eksklusi, terpilih 21 artikel sebagai data dalam penelitian. Hasil studi ditemukan bahwa terdapat kontradiksi implementasi ChatGPT pada pembelajaran matematika di Indonesia dengan tujuan Pendidikan Nasionalnya, terkhusus etika pribadi siswa. Temuan ini mencerminkan bahwa pendayagunaan AI pada pembelajaran matematika belum secara menyeluruh selaras dengan tujuan pendidikan nasional di Indonesia.

Kata kunci: Artificial Intelligence, Etika Pribadi, Inovasi Pembelajaran Matematika

Introduction

The development of digital technology has encouraged the birth of various innovations in mathematics learning. One of the most prominent forms is the use of Artificial Intelligence (AI) in the teaching and learning process (Cukurova, 2024; Guan et al., 2020). AI is no longer positioned just as a technical tool, but also as a paradigm changer for learning from a uniform one to more responsive, personalized, and adaptive to the needs of learners (Mohamed et al. 2022; Strielkowski et al. 2023; Zawacki-richter et al. 2019). In the context of mathematics learning, AI-based systems are able to analyze student learning data in real time, map the level of understanding, and present materials and feedback in a personalized manner (Dönmez, 2024; Xue & Thai, 2018). This condition shows that AI integration is not only a technological trend, but also a strategic phenomenon that has the potential to change the direction of the development of mathematics education globally.

The main advantage of AI-based learning lies in the efficiency of the learning process and the ability to apply differentiated learning (Ruslim & Khalid, 2024). Each student can learn according to their style, speed, and needs, while teachers are assisted in designing learning strategies that are more targeted and data-based. One of the concrete implementations of AI in learning is the use of ChatGPT, an AI-based chatbot that is able to answer mathematical questions, explain concepts, and provide systematic problem-solving steps (Almarashdi et al. 2024; Wardat et al. 2023). On the other hand, when viewed from the perspective of educational philosophy, learning technology cannot be considered morally neutral (Donatus et al., 2024). Plato emphasized that true education not only builds intellectual capacity, but also sharpens the soul to be able to live in goodness and act wisely (O'Hear, 2024). This view is in line with UNESCO's four pillars of education, namely learning to know, learning to do, learning to live together, and learning to be which places the formation of personality, moral responsibility, honesty, empathy, social solidarity, and a sense of justice as the core of education (Delors, 1998). These values are in line with Pancasila, especially the Second, Third, and Fifth precepts, as well as the goal of Indonesia's national education which emphasizes the formation of human beings with noble character (Presidential Decree, 2003).

Behind this positive potential, various studies show that there is a problematic side of using AI in learning. Students' reliance on AI and focusing only on the final result deprives them of the opportunity to practice critical thinking naturally (Schenck, 2024). The use of ChatGPT also raises concerns about academic ethics, such as the increasing potential for plagiarism and deviations in the use of technology (Bittle and El-gayar 2025; Li et al. 2024). The excessive application of AI can

stimulate cognitive offloading, which is the tendency to delegate cognitive tasks to technology thereby reducing independence and intellectual autonomy (Gerlich 2025; Zhai, Wibowo, and Li 2024). From the perspective of Pancasila values, this condition has the potential to erode honesty, responsibility, solidarity, justice, and the spirit of mutual cooperation (Ahuja 2023; Rahman et al. 2023; Tampubolon et al. 2024). However, although there have been many studies that discuss AI in education and academic ethics, there have not been many studies that specifically examine the impact of ChatGPT-based mathematics learning innovations on the personal ethics of educators and students using the framework of Pancasila values and the National Education Goals as the basis for analysis. In addition, studies that integrate the dimensions of divinity, humanity, unity, democracy, and social justice in evaluating the use of ChatGPT in mathematics learning are still very limited. This gap is an important space for this research.

Based on these gaps, this study offers a novelty to examine AI-based mathematics learning innovations, especially ChatGPT through the Systematic Literature Review (SLR) approach combined with bibliometric analysis using VOSviewer. This research not only captures pedagogical effectiveness, but also explicitly contextualizes the findings within the framework of Pancasila values and national education goals. The integration of Plato's educational philosophy perspective, UNESCO's educational framework, and the basic values of Pancasila provides a new perspective in assessing the use of AI that technology is not only a technical instrument, but also a medium for character formation and personal ethics. Thus, this study fills a gap in the study that has not been touched much, namely the connection between ChatGPT, personal ethics, and the internalization of Pancasila values in mathematics learning in Indonesia.

In particular, this study aims to: (1) identify and analyze how ChatGPT-based mathematics learning innovations reflect support for the values in each Pancasila precept; (2) to examine the limitations and potential incompatibility of the use of ChatGPT in mathematics learning with the values of Pancasila; and (3) mapping key research themes related to ChatGPT, personal ethics, and mathematics education through bibliometric analysis to obtain a comprehensive picture of research directions and trends in this field. This objective is directly directed to address the gaps that have been identified and explain the position of this research among previous studies.

In terms of contextual relevance, this study is becoming even more urgent considering that more and more schools and educational institutions are adopting AI technology as part of digital learning strategies. Without adequate ethical control, the use of ChatGPT has the potential to encourage students to be more outcome-oriented than process-oriented, as well as choosing

shortcuts over honest and responsible learning (Bittle & El-gayar, 2025). In addition, inequality of access to technology and digital literacy risks widening the education gap between socioeconomic groups and between regions (Ahuja, 2023). In the context of education in Indonesia, this can threaten the principles of social justice and unity upheld by Pancasila. Therefore, this research is not only academically relevant, but also urgent to provide insight into how the use of ChatGPT in mathematics learning can be directed to align with the global education mission and the nation's core values.

This research makes both theoretical and practical contributions. Theoretically, this study enriches scientific treasures by presenting an analytical framework that connects AI-based mathematics learning innovations, especially ChatGPT with personal ethics and Pancasila values. Methodologically, the use of the SLR approach combined with bibliometric analysis through VOSviewer provides a systematic overview of the current research landscape in this field. Practically, the findings of this study can be a reference for educators, policy makers, and managers of educational institutions to formulate ethical guidelines and AI implementation strategies that are in line with the goals of national education, which is to form Indonesian people who have faith, noble character, intelligence, and responsibility. Thus, the use of ChatGPT and other AI technologies can be directed not to replace students' critical thinking skills and moral integrity, but to strengthen both in a humanistic and equitable educational framework.

Research Method

Type of Research

This study uses the Systematic Literature Review (SLR) approach using a qualitative descriptive meta-synthesis method. The goal of this approach is to identify, evaluate, and synthesize the findings of previous research that examined the use of ChatGPT in mathematics learning and its relationship to the development of students' personal ethics through the perspective of Pancasila values. The research procedure follows the Kitchenham and Charters framework, which consists of three main stages: planning, implementation, and reporting. This structured framework ensures the transparency, reliability, and reproducibility of the review process.

Sample Demographics

The sample consists of scientific journal articles pulled from the Google Scholar database using the Publish or Perish software. The articles were selected based on their relevance to the research focus, namely ChatGPT, mathematics education, and the development of Pancasila-

based ethics. Thus, the unit of analysis in this study is academic publications rather than individuals or educational institutions.

Data Collection Techniques

Data collection is carried out through a systematic search process using Publish or Perish software connected to the Google Scholar database. The search was conducted using a predetermined set of keywords related to ChatGPT, mathematics learning, and ethical values or Pancasila. The obtained articles are then screened using specific inclusion and exclusion criteria to ensure relevance and quality. Only articles that meet these criteria are included for further analysis. Furthermore, the selected articles were processed for bibliometric analysis using VOSviewer to map the relationship between studies and research trends related to the topic.

Data Analysis Techniques

Data analysis is carried out in two main stages: bibliometric analysis and qualitative metasynthesis. The bibliometric analysis, conducted with the help of VOSviewer, classified the selected articles into two main categories: (1) studies that support the use of ChatGPT in promoting the values of Pancasila in the five precepts, and (2) studies that do not support or highlight the challenges of using ChatGPT in this context. After this, a qualitative synthesis is carried out to interpret and integrate the findings of the two categories. This synthesis provides a comprehensive understanding of how AI-based learning innovations, particularly ChatGPT, can contribute to or challenge the development of students' personal ethics that are in line with Indonesia's National Education Goals.

Results and Discussion

Planning Stage

The researcher conducted a keyword search for articles through the Google Scholar database with the help of the Publish or Perish software. However, not all of these articles are relevant to the purpose of the study. Therefore, the researcher carried out a data screening process that was tailored to the focus and objectives of the research. In the screening process, researchers obtained 280 articles in the early stages of literature search. After going through the analysis and screening process based on relevance criteria, 21 articles were selected that were in accordance with the focus of the study. These articles are presented systematically in tabulation form according to the predetermined method. The process of presenting the results of this screening refers to the formulation of research questions that aim to examine the extent to which artificial intelligence-based mathematics learning innovations, especially ChatGPT, support or lack of support for

Pancasila values. The following is the formulation of the research questions: (1) How does ChatGPT-based mathematics learning innovations reflect support for the values in each precept in Pancasila?, (2) How does ChatGPT-based mathematics learning innovations reflect the limitations in supporting the values in each precept in Pancasila?. This analysis process is intended to provide a clearer picture of the extent to which ChatGPT can play a role in internalizing and applying Pancasila values in education, as well as to identify areas where these innovations still need to be developed or paid more attention to be in line with national education goals and the values contained in Pancasila.

Implementation Stage

This study was carried out through a meta-synthesis approach to a number of scientific articles that discuss mathematical learning innovations using ChatGPT. The main focus of this study is to analyze the extent to which these innovations reflect and support personal ethical values that are in line with Pancasila as the basis of the Indonesian state and the direction of national education. Each article studied is analyzed qualitatively by referring to the five precepts of Pancasila. The analysis was carried out to identify whether the application of AI, especially ChatGPT, in mathematics learning supports or does not support the internalization of these values. To support this process, in table 1, data extraction of the main keywords that describe the ethical direction of the application of technology in education is carried out.

Table 1. Search Keywords Results

The Five Principles Of Pancasila	Keywords	Search Results
1. **Belief In The One And Only One God**	Divine Values In Chatgpt-Based Technology	Support
	Chatgpt Without Religious Ethics, Moral Neutrality In Chatgpt	Less Supportive
2. **Just And Civilized Humanity**	Human Centered Chatgpt, Inclusive Chatgpt Integration	Support
	Bias In Chatgpt Algorithms	Less Supportive
3. **The Unity Of Indonesia**	Chatgpt For Digital Social Cohesion, Chatgpt For National Unity	Support
	Digital Divide In Chatgpt Access	Less Supportive
4. **The Inner Wisdom Of Deliberations Among Representatives Guides Democracy**	Collaborative Decision-Making With Chatgpt	Support
	Chatgpt Dominance In Decision-Making	Less Supportive
	Educational Equity Through Chatgpt	Support

5. Social Justice For All Of The People Of Indonesia	Digital Inequality In Chatgpt Integration, Unequal Access To Chatgpt-Based Technology	Less Supportive

After formulating and grouping keywords based on the precepts of Pancasila as presented in Table 1, the next step is to extract data from each article that is the subject of study. This process is to identify the representation of personal ethical values in the context of mathematics learning using ChatGPT, as well as to evaluate the extent to which Pancasila values are integrated or neglected in these innovations. Table 2 presents a summary of the extraction results which includes the code and narrative of relevance to Pancasila. The data was used as a basis for visualizing the relationships between concepts using the VOSviewer software, to display the patterns of value linkages and the intensity of the most dominant topics in the literature analyzed.

In this study, a special coding system was used to classify and identify the articles that were systematically analyzed. For example, the code 125_2_102 consists of several sections that represent important information about the article. The number 1 indicates the serial number of the article in the list of literature that has been collected, while the number 25 indicates the year the article was published, which is 2025. Next, the number 2 after the underscore indicates the continent the article came from. After that, the number 1 after the underscore also indicates that the article is related to the first precept of Pancasila. Then, the number 0 indicates that the article supports the value of the precept. Finally, the number 1 at the end of the code represents the second keyword that is the focus of the analysis, namely "Divine Values in ChatGPT-based Technology". Using this code, researchers can easily group and analyze data based on the order of the article, year of publication, geographical location, Pancasila values, the level of support for these values, and the focus of keywords. This coding system speeds up the process of evaluating and interpreting data in the studies conducted.

Table 2. Article Data Extraction Results

Code	Relevance to Pancasila	Description of Findings	Personal Ethics
125_2_101 (Saleh et al. 2025)	Support precept 1	Integrating local wisdom and technology such as ChatGPT at the Al-Risalah Islamic Boarding School, supports preserving divine and religious values.	Preservation of religious values, moral and spiritual strengthening

225_3_111 (Nam and Bai 2023)	Less supportive Precept 1	ChatGPT focuses more on technological and pedagogical aspects without considering ethics and spiritual awareness.	Moral neutrality, lack of attention to academic honesty, and spiritual awareness
323_2_112 (Busuttil and Calleja 2025)	Less supportive Precept 1	ChatGPT is not responsible for the correctness of the information produced	Absence of moral responsibility, ethical awareness
423_2_201 (Wardat et al. 2023)	Support precept 2	ChatGPT can provide comprehensive geometry instruction	Justice, care, and responsibility in learning.
524_4_202 (Lin and Riccomini 2024)	Support precept 2	ChatGPT in inclusive mathematics learning helps meet the learning rights of students with disabilities in rural areas.	Justice, anti-discrimination, equality of learning rights
624_4_201 (Song et al. 2025)	Support precept 2	ChatGPT help create fair, personalized, and empathetic learning for all students	Empathy, justice, and respect for diversity
725_2_211 (Li et al. 2025)	Less supportive precept 2	Studies focus more on the context of English-speaking countries and specific fields of science.	Justice, respect for human dignity
823_0_211 (Abramski et al. 2023)	Less supportive precept 2	The study identified a negative bias in large language models such as GPT-3, ChatGPT, and GPT-4 toward math and STEM fields.	Justice, respect for human dignity
925_0_301 (Egara and Mosimege 2024)	Support precept 3	ChatGPT interconnection supports inclusive and participatory learning	Responsibility
1024_0_302 (Rizos, Foykas, and Georgakopoulos 2024)	Support precept 3	ChatGPT here is technology as a unifier in the preparation of student worksheets in learning.	Tolerance, solidarity, empathy
1124_0_301 (Pepin, Buchholtz, and Salinas-Hernandez 2025)	Support precept 3	ChatGPT can facilitate the need for learning in a more inclusive way.	The spirit of unity and togetherness

1224_0_302 (Mayilyan 2024)	Support precept 3	ChatGPT in STEM education can have the potential to create inclusive and equitable learning.	The spirit of unity and togetherness
1323_3_311 (Sánchez-Ruiz et al. 2023)	Less supportive precept 3	ChatGPT can cause a gap in the learning quality of students who have different socioeconomic backgrounds.	Social responsibility, Empathy
1424_1_311 (Egara and Mosimege 2024)	Less supportive precept 3	There is a lack of awareness among teachers in Nsukka-Nigeria in the use of ChatGPT where only 17% of teachers are familiar with the technology.	Social responsibility
1524_3_401 (Schorcht, Peters, and Kriegel 2025)	Support Precept 4	ChatGPT was allocated as a facilitator who acted as a multidisciplinary team	Communication and Collaboration
1624_2_411 (Quah 2024)	Less supportive precept 4	ChatGPT is able to create dependency and reduce critical thinking skills.	Intellectual independence, responsibility
1724_2_411 (Nhyl et al. 2024)	Less supportive precept 4	ChatGPT that is too dominating can reduce student involvement in deliberation and discussion.	Intellectual independence, responsibility
1823_2_501 (Gouia-Zarrad and Gunn 2024)	Support Precept 5	ChatGPT can minimize educational gaps through personalized and interactive learning.	Equality of learning opportunities
1924_1_501 (Judelyn L. Patero 2023)	Support Precept 5	ChatGPT in learning can provide the same learning opportunities for students with high to lower secondary.	Justice, equality, and non-discrimination
2024_2_511 (Li 2025)	Less supportive Precept 5	Significant digital gap between urban and rural areas which can trigger inequities in the quality mathematics education.	Justice, Empathy

2124_2_512 (Li 2024)	Less supportive Precept 5	ChatGPT integration can be a gap in areas that have infrastructure inequality.	Justice, equality

As for the next, in Table 2, further analysis was carried out using the VOSviewer device to find out thematic relationships, key keywords, and emerging research trends. This process is carried out through bibliometric mapping based on the co-occurrence of keywords in the metadata of the article being studied. The results of the visualization obtained show that there are certain clustering that represent the main focuses of research on this topic.
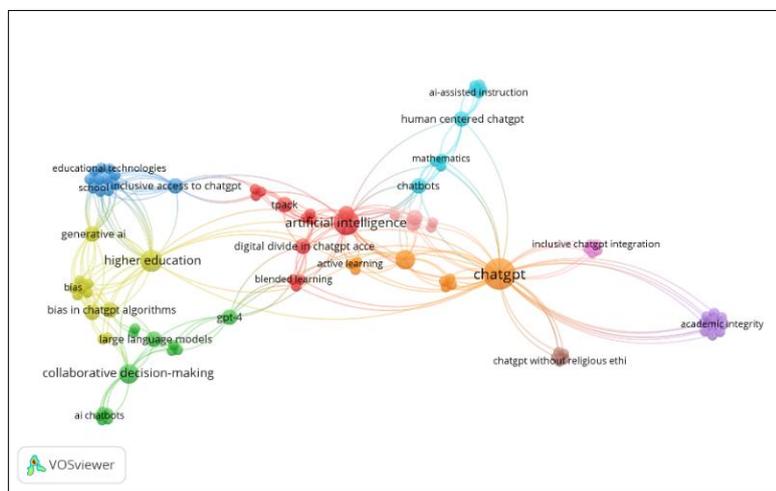

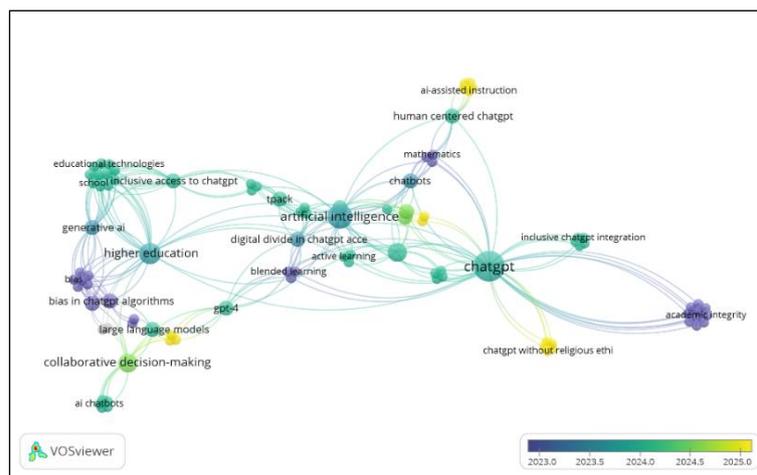**Figure 1**. Vosviewer Network Visualization results (See link: https://h7.cl/1fG6C)

Figure 2. Vosviewer Overlay Visualization Results (See link: https://h7.cl/1fG71)

Figure 3. Vosviewer Density Visualization results (See link: https://h7.cl/1fG7F)

Reporting Stage

1. ChatGPT-based mathematics learning innovations reflect support for the values in each precept in Pancasila

ChatGPT-based mathematics learning innovations have proven to be in line with the values of Pancasila, ranging from strengthening spirituality (125_2_102), supporting inclusivity and justice (423_2_201; 524_4_202; 624_4_201), strengthening collaboration and unity (925_0_301; 1024_0_304; 1124_0_301; 1224_0_303), contribution to decision-making (1524_3_402), to the creation of equitable adaptive learning (1823_2_501). These findings are in line with international
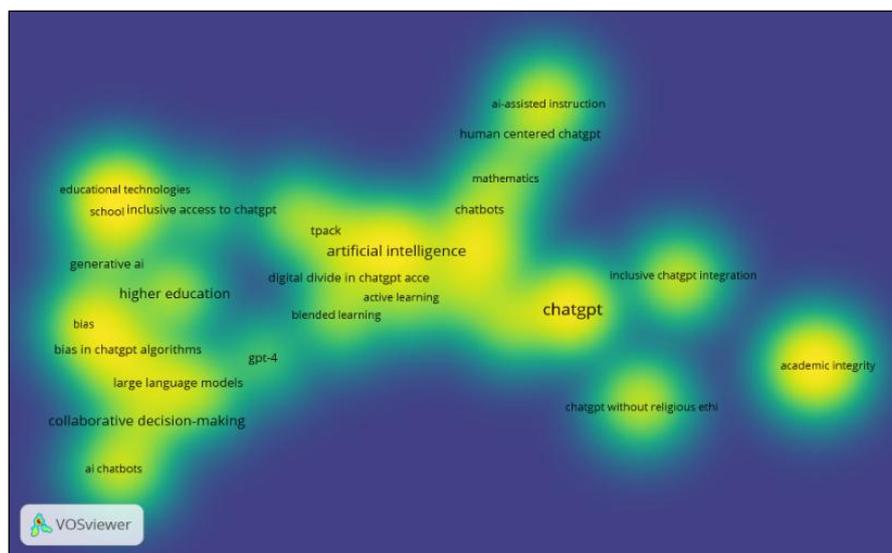
research such as (Attard and Holmes 2022) and (Trust, Whalen, and Mouza 2023) that show that AI is capable of improving access, personalization, and equity in learning, although it still requires ethical oversight. Compared to outside research that highlights the risk of bias, this study shows that the integration of ChatGPT can actually be combined with the values of Pancasila so as to expand understanding of the implementation of AI based on cultural contexts. Thus, this research contributes to the development of science and technology through the presentation of a model for the use of AI that is humanistic, ethical, and relevant to the character of Indonesian education.

2. ChatGPT-based mathematics learning innovations reflect the limitations in supporting the values in each precept in Pancasila

Some of the ChatGPT-based mathematics learning innovations show limitations in supporting spiritual values as seen in studies (225_3_111; 323_2_112) which highlight the absence of integration of religious values, thus potentially weakening the character of students;

These findings are in line with international studies such as (Rudolph, Ismail, and Propenici 2024) that criticize the moral neutrality of AI. In the Second Precept, studies (725_2_211; 823_0_211) show social and gender bias as well as a lack of attention to vulnerable groups, reflecting the inequality of access to learning that in global research was also identified by Bender et al. (2021). In the Third Precept, studies (1323_3_311; 1424_1_311) show a gap in technology access between regions similar to the findings of the international literature on the digital divide, for example in Sub-Saharan Africa. The challenge to the Fourth Precept can be seen in the studies (1624_2_412; 1724_2_412) which reveal the dominance of technology in the decision-making process, thereby reducing students' deliberation space. In the Fifth Precept, the (2024_2_511; 2124_2_513) studies affirm the digital inequality between developed and disadvantaged regions, reinforcing the global finding that technology without equity actually widens inequality. Overall, these findings are consistent with the state of the art that highlights biases, gaps, and technological dominance, while making an important contribution to the development of science and technology by emphasizing the need for the design and implementation of AI that is ethical, fair, and sensitive to Indonesia's socio-cultural context in order for digital transformation to truly support national education goals.

3. Vosviewer Network Visualization Results Description

Based on the bibliometric visualization in Figure 1, the term "ChatGPT" appears to be the main node in the research network, with clusters such as inclusive ChatGPT integration, human-centered ChatGPT, ai-assisted instruction, and active learning that show the potential of this technology in supporting Pancasila values and national education goals, especially related to inclusivity, access equity, and student-centered learning. Topics such as collaborative decision-making and higher education also affirm ChatGPT's role in increasing collaboration and active participation. However, the emergence of the theme of bias in chatgpt algorithms, digital divide, academic integrity, and chatgpt without religious ethics indicates that there is a risk that can weaken the value of national education if not managed properly. These findings are in line with the research of (Li 2024; Schenck 2024) that also highlight biases, access gaps, and academic integrity issues in the use of AI. Thus, this visualization contributes to the development of science and technology by emphasizing the need for the development and implementation of AI that is more ethical, inclusive, and in line with the noble values of Indonesian education.

4. Vosviewer Overlay Visualization Results Description

Figure 2 shows an overlay visualization that maps the development of ChatGPT research topics from 2023–2025, with artificial intelligence, higher education, inclusive ChatGPT integration, academic integrity, and ai-assisted instruction as the themes most strongly connected to the main node "ChatGPT", while human-centered ChatGPT and chatgpt without religious ethics emerge as the latest trends highlighting issues of ethics and humanism. However, the religious dimension as part of the values of Pancasila seems to be minimally discussed, shown by only one article with the keyword "Divine Values in ChatGPT-based Technology". These findings are consistent with the research of (Choi and Min 2024; O'Hear 2024) which also noted the lack of global attention to the moral-spiritual aspects of educational AI research. Thus, this visualization overlay contributes to the development of science and technology by emphasizing the need for the development of AI that is not only innovative, but also integrated with ethical values and national educational character.

5. Vosviewer Overlay Visualization Results Description

Figure 3 shows the results of density visualization using VOSviewer which maps the density of keyword occurrences in studies related to the use of ChatGPT in the education sector. The yellow color indicates the area with the highest intensity, while green to blue depicts lower density. The keyword "chatgpt" was at the center with the most dominant frequency, followed by terms such as artificial intelligence, higher education, inclusive chatgpt integration, academic integrity, and ai-assisted instruction, indicating that these topics were the main focus of the research. However, religious values and ethics based on spirituality seem to receive less attention; Terms such as "chatGPT without religious ethics" are in low-density areas, and only one article—from Indonesia—mentions divine values through the keyword "Divine Values in ChatGPT-based Technology". This condition shows that the integration of Pancasila values, especially the first precept, is still very limited in the global literature. These findings are in line with the studies of Choi (2024) and O'Hear (2024) which both highlight the lack of discussion of the moral-spiritual dimension in educational AI research, thus confirming that the gap is also a global pattern. Thus, the results of this density visualization contribute to science and technology by emphasizing the need to develop research that is able to integrate artificial intelligence with ethical and spiritual values so that AI innovation in education remains in harmony with the character and goals of national education.

Conclusion

The main purpose of this study is to evaluate the integration of ChatGPT in mathematics learning through the ideological perspective of the five precepts of Pancasila. The findings of the study show a complex duality that is, these technologies provide functional support in certain computational contexts but show significant inalignment with the moral and ethical dimensions of the curriculum. In particular, the results of the study state that although AI helps in acquiring information and solving problems, these tools often bypass the character-building process that is at the core of the national education philosophy. This inconsistency shows that the unsupervised use of technology is not fully in line with the holistic goals of Indonesia's national education system. Thus, the adoption of ChatGPT cannot be seen as a purely positive progress without acknowledging the existence of critical friction points related to the formation of students' character and national identity.

This conclusion was obtained through a directed mapping of various interactions between ChatGPT and students in the context of mathematics learning which was analyzed using a value framework from the first to the fifth precept of Pancasila. The analysis process is carried out with a qualitative approach, where the AI output is not only examined in terms of mathematical accuracy, but also the extent to which the response is in line with the values of honesty, the ability to work together, as well as the principles of deliberation and consensus. From the in-depth analysis, a number of weak points or "blind spots" were found where the speed and efficiency of AI actually reduced the basic purpose of learning. This approach allows for information beyond just the technical aspect, namely assessing how the use of AI affects social and cultural aspects in the learning process. Through careful comparison, it was possible to identify areas that show technological support as well as areas that have the potential to cause clashes with ideological values.

To address the inconsistencies found, further research should prioritize the development of pedagogical frameworks that specifically regulate the ethical use of AI in Indonesian classrooms. The next study needs to focus on the application of the human-in-the-loop strategy, which is a mechanism in which teachers are actively involved in mediating interactions between students and AI so that character values are maintained. In addition, further exploration is needed on the potential of prompt engineering in adjusting AI responses to be more in line with local cultural norms and Pancasila values. The limitations of this study related to the sample size and the topics discussed show the need for broader research at various levels of education. Researchers are also

encouraged to review policy recommendations that can formalize the role of AI, so that it is not only the object of passive prohibition, but part of value based regulation.

In the long term, this research supports efforts to build an educational ecosystem that is not only technologically advanced, but also solid in national values. The vision is to present a learning environment where artificial intelligence is used as a flexible tool to strengthen the learning process, without replacing the role of humans in the development of science and technology in Indonesia. When a balance between AI efficiency and ethical values can be achieved, education systems have the opportunity to produce a generation that is able to compete at the global level while still maintaining a local identity. In the end, this research emphasizes the urgency of digital sovereignty, namely the use of technology to strengthen national ideology. The ultimate goal is to create a mutually reinforcing relationship between future technological innovations and the noble values of Pancasila.

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