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Evaluating the Accuracy of selected AI Tools in Identifying Methodological and Theoretical Gaps in Research Literature

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ABSTRACT

This study evaluates the accuracy and effectiveness of various AI tools in identifying methodological and theoretical research literature gaps in educational management. The comparative analysis involves six AI tools: Chat GPT4o, Chat GPT4, Chat GPT 3.5, Perplexity AI, SCI Space, and Julius AI. Each tool was tasked with identifying valid and relevant research gaps and providing accurate sources in APA 7th edition format. The validation process included cross-referencing AI-generated results with existing literature and evaluating the accessibility and relevance of the provided sources. The study's secondary data processing procedure ensured consistency and reliability by using standardized commands, cross-referencing sources through reputable academic databases, and conducting independent reviews. Gaps and sources made by AI were put together into a full file as part of the data analysis. Also looked at were how important and true the gaps were, and a scoring system was created to see how well each AI tool did. The results show that the AI tools are not all the same in how accurate and useful they are. The sources on Chat GPT4o and SCI Space were true and easy to find, so you could trust them. But Chat GPT4 and Chat GPT 3.5 were limited because they didn't have any sources or sources that worked with them. Perplexity AI had trouble with references that weren't very clear, but Julius AI did a good job of filling in the holes with good sources that were easy to find. People need to check the data that AI makes, says the study, to make sure that academic honesty and rigor are maintained. Researchers can learn useful things from this study about how to use AI tools in their work. It also shows how important it is to think critically about AI results and compare them to what has already been written. University ethics review boards might have to change a lot because of this study. This is because the study looks at how to make sure that research papers written by students, teachers, and staff are honest and of high quality.

KEYWORDS

AI tools, Methodological Gap, Theoretical Gap, Chat GPT4o, Chat GPT4, Chat GPT 3.5, Perplexity AI, SCI Space, Julius AI, educational management, literature

INTRODUCTION

In the past few years, the fast growth of artificial intelligence (AI) has changed many fields, including schooling. AI tools are being used more and more to make research easier. They can automatically look over the literature and find holes in the study. A lot of good things can come from these AI tools, but not much is known about how

good they are at finding methodological and theoretical gaps in the body of educational research literature. It is very important to correctly find these gaps if we want to learn more and solve important management issues in schools. Because there is a huge amount of educational books that researchers need to find their way through quickly and accurately. Reading books by hand the old way takes a long time and is prone to mistakes. AI tools say they can speed up this process by quickly going through huge amounts of text and finding holes that humans might not notice right away. But these tools don't all work the same way. Some give you wrong or broken links, for example. Because of this, their work needs to be checked over very carefully to make sure it is correct and trustworthy. This paper compares these tools carefully and lists their pros and cons so that professionals who want to use AI in their work can get a sense of how useful they are. This is an interesting analysis that adds to the study of how to run schools. When AI is running research, this shows how important it is to have human review to keep academic honesty and standards.

The Promise and Challenges of AI in Identifying Research Literature Gaps in Educational Management

It's important to find holes in the methodological and academic study books in order to make things better and learn more about running schools. As AI tools have grown quickly, they have given researchers new ways to speed up the literature review process and find these gaps more quickly. Still, the fact that these AI tools aren't always right or trustworthy is a big worry. AI might change the way research is done, but there isn't a lot of proof that these tools are good at finding real, important study gaps. In the Philippines, teachers and school leaders are using AI for study more and more. We can see from this trend that more and more people around the world want to use AI to improve the way schools work. Teacher in the Philippines said that AI-made results should be checked and approved more than once to be sure they are right (Reyes, 2020). How useful AI tools are in this area may also depend on how simple it is to gather good data and how knowledgeable teachers are about computers (Martinez & Alonzo, 2021). This study says that using AI tools for research on education in the Philippines could be very helpful, but only if teachers are trained well and there are strong ways to check that AI results are correct. This way will help you get the most out of AI while still following the rules and being honest in school. It is stressed how important the changes are for managing schools, especially when it comes to the quality of student work and the right way to use AI technologies. It was found that AI tools could make it easier and faster to find gaps in the research field. This could lead to better study results that are ready to be shared. But it does show that not all AI tools can be trusted. That's the reason why human control and peer review are so important for making sure that school rules are followed. The study also talks about the moral issues that come up when AI is used for good, mostly when it comes to privacy and ethics. AI is getting more important for experts and teachers. It is important to set high ethical standards and make sure that AI tools are used properly to keep private data safe and the research process honest. This method is fair and follows good academic and moral standards in educational study. It will help you get the most out of AI.

Theoretical Grounding

They helped me think of ideas for this paper: the Technology Acceptance Model (TAM) and the Diffusion of Innovations (DOI). These ideas explain how people use and accept technology at school. In 1989, Davis was the first person to bring this up. It was known as the Technology Acceptance Model (TAM) by him. It says that people pick a tool based on how simple and useful they think it is. What do teachers and students think about AI tools and how do they use them to fill in the gaps in the work that has already been done? TAM wants to learn more about how people accept and use technology in schools. This study fits with that goal by looking at how easy and useful the AI tools are. In 1962, Rogers also came up with the Diffusion of Innovations (DOI) theory. This theory tells us how, why, and how fast new ideas and tools spread through groups. We can use this theory to better understand how AI tools are used in the classroom and why people choose to use these technologies or not. When we look at how accurate and reliable AI tools are, we learn more about how they can be used to help students learn. It also looks at what could make these tools easier or harder for a lot of people to use. With these theory models, we can get a good idea of how well AI tools are used in education. During the integration process, they also show how important human control and moral concerns are.

Research Gap Statement

AI is being used more and more for different types of research, such as reading different types of books, analyzing data, and finding research gaps. AI has been shown in several tests to make these tasks much easier and faster. This frees up teachers to focus on using research results to make learning better (Smith & Anderson, 2020). The Philippines is trying to update its education system and deal with long-standing problems like a lack of resources and teachers who need to improve their skills (Dela Cruz & Gonzales, 2021). This makes the use of AI in educational research all the more important in that country. Articles and study papers show that AI tools can help a lot with finding relevant literature, analyzing large datasets, and giving insights that traditional research methods might miss. Platforms powered by AI, such as Chat GPT, have been used to speed up the literature review process by quickly summarizing huge amounts of data and offering possible research directions (Garcia & Santos, 2022; Talreja & Agashe, 2024). Even though these benefits exist, there are worries about the accuracy and dependability of study results produced by AI. It tries to fill that gap by looking at six AI tools side by side: Chat GPT4o, Chat

GPT4, Chat GPT 3.5, Perplexity AI, SCI Space, and Julius AI. By looking at how well these AI tools work at finding methodological and theoretical gaps in research on educational management, this study aims to show what their pros and cons are. This study was inspired by the fact that academic research is relying more and more on AI and that the results of AI-generated tasks need to be carefully checked. Researchers have already found that AI can speed up the research process. But they also say not to put too much faith in AI without fully testing it. To put these worries to rest, this study carefully looks at the results of some AI tools, compares them to results from other studies to make sure they are right, and then makes some suggestions for future research. What we find out will help us understand the pros and cons of using AI tools in school study better. Also, they show how important it is to have human review to keep academic integrity and speed.

Research Questions

The main point of this study was to show that some AI tools are reliable and can be used to find research gaps in the field of educational management. It was mostly about solving two main questions: (1) How well do some AI tools know how to find gaps in the research papers on methods for managing schools? Question 2: How reliable are the APA 7th edition texts they give you? And (2) How well do some AI tools find holes in the theoretical literature on educational management, and how reliable are the APA 7th version sources they give you?

MATERIALS AND METHODS

Research Design

The purpose of this study was to compare and contrast different AI tools to see how well they can find gaps in the research literature for methodological and theoretical research in educational management. There was a close look at the outcomes of six AI tools. These were Chat GPT4o, Chat GPT4, Chat GPT 3.5, Julius AI, Perplexity AI, and SCI Space. Each tool was put to the test to see how well it could find real and important research gaps and give proper APA 7th edition sources. The results from the AI were checked against current research to make sure they were correct. The sources that were given were also checked to make sure they were useful and available.

Online Links of the AI Tools and their description

In this study, AI tools were used to find gaps in methodological and theoretical research papers in educational management. Table 1 shows these tools. One new improvement to OpenAI's GPT model is Chat GPT4o, which helps it understand and use everyday words better. The search functions are very powerful, and the word data can be analyzed in great detail. Another form from OpenAI is Chat GPT4. Its job is to give good answers and is used for many things, such as making content and helping with research. Chat GPT 3.5 is great at making text sound like someone wrote it. It lets you do lots of things, like write books and papers. Perplexity AI is a newer AI tool that focuses on making it easy to read and write text. This makes it useful for school and study. The goal of SCI Space is to learn science. It can do things like automatically look over the existing study and find gaps in research in certain scientific areas. To help people study, Julius AI gives proper citations and looks for gaps in the research. It helps with a lot of different kinds of school writing and makes sure that rules for citing sources are followed.

Table 1. Online Links of the AI Tools and their description

AI Tool	Description	Online Link
Chat GPT4o	Advanced natural language understanding and generation for complex queries and analysis.	https://openai.com/chatgpt/
Chat GPT4	High-quality responses for research assistance and content generation.	https://openai.com/chatgpt/
Chat GPT 3.5	Robust performance for generating human-like text and conducting literature reviews.	https://openai.com/chatgpt/
Perplexity AI	Focuses on improving understanding and generation of text for educational and research use.	https://www.perplexity.ai/?login-source=oneTapHome
SCI Space	Tailored for scientific research, offering automated literature reviews and gap identification.	https://typeset.io/
Julius AI	Assists with research by providing accurate citations and identifying literature gaps.	https://julius.ai/

Secondary Data Processing Procedure

There were several steps in the secondary data processing method to make sure that all of the AI tools' results could be seen. Start with giving all eight AI tools the same task: find gaps in the methodological and theoretical study books in educational management and give sources in APA 7th edition format. After that, the data was put together in a way that made it easy to compare them. After that, the holes and their sources were checked to make sure they were correct. Online scholarly libraries and search engines were used to make sure the sources were useful and easy to findHey. Sources that either couldn't be found or didn't directly fill in the gaps that were found

were talked about. This was done to check how useful and accurate each AI tool was. First, the sources were checked to make sure they could be trusted. Why did they look at these tools side by side? They checked how correct and easy to find the sources were, as well as how constant the results were from each tool. They also looked at how important the study gaps were to the field of educational management. Lastly, the results of the study were put into a table that showed how well every AI tool did its job. A lot of people talked about how reliable the tools were, but the main point was that people should check the results of AI. It was clear what each AI tool did well and not so well when it came to finding study gaps once all the results were put together. They were able to think of ways to use these tools to study education because of this.

Ethical Principles of the Paper

In this study, the research method needs to follow a set of moral rules to make sure that the results are honest and trustworthy. If you want to use AI tools to find study gaps, you need to make sure that the results they give you are correct and don't spread false or confusing information. It is important for researchers to check all the sources that AI tools give them against well-known academic databases to make sure they are correct and useful. To avoid mistakes and confusion, it's also important to be clear about which AI tools are used and how the data is changed. The study also shows how important it is to follow privacy rules and keep private information safe, especially when you have private or sensitive information in your schoolwork. It is responsible and reliable to use AI tools in school research if these moral standards are followed in the study. This is good for the field of managing schools.

Quality Assurance Protocol

There is a strong quality testing system in place to make sure that the way data is handled is real and honest. It had a number of important steps: First, the same standard order was given to all AI tools to make sure that entering data was always the same. This made sure that all of them gave the same directions. Second, the sources for each AI tool were checked very carefully to make sure they were correct and easy to find. Scholarly libraries and search tools that people trust had to be used to check each source. Third, another researcher looked over the first results on their own to make sure they were correct and that the review was fair. It was agreed upon that the differences or mistakes found during this review were fixed by going over them again. Also, every step of the process was carefully written down, such as the first AI results, the steps taken to make sure they were right, and the results of the compared analysis. This writing work made the study easier to understand and do again. Checks were set up to see how things were going and fix any new problems right away. The high standards of accuracy and reliability set by the study were kept when these steps were used to check how well the AI tools found gaps in the research literature.

Data Analysis

A planned method was used to compare the results of the chosen AI tools in order to find gaps in the methodological and theoretical study books in educational management. The holes caused by AI and the sources that filled them were first put together in one big group. Another step was taken to make sure the gap was important to the field after it was found. It was looked at to see if it talks about current problems or parts of school management that haven't been looked into yet. To make sure the sources given were good and could be used to fill in the gaps that had been found, databases from academia were used. We checked each AI tool's accuracy and usefulness by looking at three things: how important the study gaps were, how reliable the sources were, and how consistent the outputs were. By making comparison tables that showed their pros and cons, it was possible to see how well each tool worked. To find patterns and learn something from the data, statistical methods like frequency analysis and cross-tabulation were used. They put the results together to see which AI tools could find gaps in the study papers the most reliably and correctly. This was helpful advice for experts who use AI in their work.

RESULTS AND DISCUSSION

Comparative Analysis of AI Tools in Identifying Methodological Research Literature Gaps in Educational Management

Table 2 shows the outcomes of a study that looked at several AI tools, such as the Chat GPT4o, Chat GPT4, Chat GPT 3.5, Perplexity AI, SCI Space, and Julius AI. Finding and filling in gaps in the study literature on educational management methods was harder and more accurate with some of these tools than with others. Chat GPT4o pointed out a need for more in-depth mixed-methods studies on how different leadership styles affect how motivated teachers are to do their jobs and how well their students do in school. It's clear that Hallinger and Heck (2011) agree with this gap, so the tool's results are valid and trustworthy. According to Chat GPT4, there is a need for a more thorough study of how technology can be used to improve management processes. However, the source provided, Fernandez and Shaw (2020), does not substantiate this gap, indicating a limitation in the tool's accuracy. In like manner, **Chat GPT 3.5** highlighted the need for studies on the effectiveness of AI and ML in decision-making processes within educational institutions. The source provided (Smith & Johnson, 2020) is not found in the search engines, thus questioning the validity of the gap identified. As to the **Perplexity AI** pointed out a gap in research on the impact of social media on teaching critical thinking skills, particularly in Saudi Arabia. Although

a relevant source was provided (Alsaleh, 2020), it does not directly support the identified gap, affecting the tool's reliability. For the **SCI Space** emphasized a gap in the exploration of management functions such as commanding, coordinating, and organizing within the Indian School Education System. This gap is well-supported by two valid sources (Sarkar, 2020; Ali, 2014), indicating high accuracy and reliability, and finally, **Julius AI** identified a gap in the use of longitudinal studies to assess the long-term impacts of educational policies on student outcomes. This gap is supported by the source given (Schneider & McDonald, 2006), which shows that the tool works well and is accurate. There are differences between the AI tools when it comes to how well they find and fill in gaps in the study literature. It was simple to believe in tools like Chat GPT4o and SCI Space since they provided real sources to fill in the gaps that were found. It was not as good as Chat GPT4 and 3.5 because they either couldn't find sources to back up their claims or gave sources that don't exist, which made them less dependable. Researchers use AI to look at what has already been written and find holes in the information. This finding is important for them. Trustworthy AI tools can speed up research and find gaps in our knowledge that can help direct future research. But sometimes different tools don't work well together. This is the reason why academics need to do manual book searches to make sure that the results that AI gives them are right and accurate. AI tools can help you find gaps in the research, but you need to carefully read their results and see how they match up with other studies. It's clear from this comparison that some tools, like Chat GPT4o and SCI Space, do the right thing while others might need more work to be sure they're on the right track. As AI gets better, it's likely to play a bigger role in educational studies.. But people still need to keep an eye on things to make sure that academic standards are met and that study is done honestly.

Comparative Analysis of AI Tools in Identifying Theoretical Research Literature Gaps in Educational Management

We can see that not all of the AI tools in Table 3 are equally good at finding and filling in gaps in the theoretical study literature. For example, Chat GPT4o and Chat GPT 3.5 were able to fill in important gaps with true and easy-to-find sources. You can trust their work, and it can help guide future research in the area of managing schools. Many thanks to Chat GPT4 and SCI Space for pointing out important areas that need more study and filling in any gaps in our understanding. For Perplexity AI, it found a theoretical gap but had trouble checking the source, especially since the reference to Nosanow (2024) was just a guess. It filled in a gap for Julius AI and gave him a good, easy-to-find source. This shows how useful mixed methods research can be in teaching settings. But the results show that AI tools can be very helpful for finding holes in the theoretical study literature. However, the results they give are not always correct and can't be trusted. You could trust tools like Chat GPT4o, Chat GPT4, and SCI Space because they gave valid and easy-to-find sources to fill in the gaps that were found. What was wrong with Perplexity AI, though, was that it used sources that were either guesses or couldn't be proven. This study shows researchers how important it is to compare results from AI with searching the books by hand to make sure the gaps found are accurate. AI tools that you can trust can speed up research and find knowledge gaps that can help guide more research in the future. This is because tools aren't always reliable, so AI results need to be carefully looked over and compared to recent study. AI tools can help you find study gaps, but you still need a person to keep an eye on things to make sure they are fair and up to standard. AI will likely play a bigger part in educational research as it gets better. The results that AI comes up with will still need to be checked by experts to make sure they are right and useful.

Comparing AI tools for finding gaps in the study literature shows that not all of them are accurate or reliable. This shows how important it is for humans to keep an eye on things and give them critical feedback. Chat GPT4o and SCI Space were very reliable because they always gave correct and easy to find sources. This means that they might be useful for academic study. But Chat GPT4 and Chat GPT 3.5 had issues, such as sources that weren't backed up or didn't exist at all, which makes people doubt their reliability. This difference shows how important it is for researchers to manually search books to compare the results of work made by AI to make sure that academic standards are met and honesty is kept. Many other studies have also shown how important it is to check the results that AI gives you to make sure they are correct and useful for educational research (Smith & Anderson, 2020; Reyes, 2020). These results back this up. If you use AI tools for schoolwork, there are some moral issues that come up. Some of these are data privacy and the right way to use AI. People who teach and do study need to set high moral standards to protect private data and make sure AI tools are used correctly. This way not only makes AI work better, it's also good for school and society. The study shows that AI tools can help a lot with finding research gaps, but they can't fully take the place of human sense and control. This answer tells you a lot about how to run a school. It shows how important it is to find a balance between how fast AI can work and how carefully people can check their work. This work changes a lot about how AI can be used in a school setting. This proves that AI tools can help researchers find missing data, but they should only be used with close human guidance to make sure the outcomes are correct and useful. This balanced method is needed for ideas about how to run schools to move forward. The same is true when trying to figure out how AI can be used to help people study without lowering the standards of education. Another thing the study shows is that AI has a lot of promise in educational research. This is because it can quickly look through large amounts of data and find new insights

that might not be obvious with older research methods.. But people who depend too much on AI need to learn how to think critically in order to keep the integrity of educational studies.

CONCLUSION

The goal of this study is to find out how accurate and useful different AI tools are for finding gaps in the research literature in educational management that are related to methods and theories. Some of the AI tools that were looked at were Chat GPT4o, Chat GPT4, Chat GPT 3.5, Perplexity AI, SCI Space, and Julius AI. The results show that these tools do not work at all the same way. It's best to use Chat GPT4o and SCI Space because they always give you good sources that are easy to find. What went wrong with Chat GPT4 and Chat GPT 3.5, though, was that they used sources that weren't dependable or didn't exist at all. This is proof of how important it is to have a person oversee the study. The study makes it clear that AI tools can make literature reviews much more efficient and help find research gaps, but their results need to be checked very carefully to make sure they are correct and useful for researchers. Another part of the study talks about the moral problems that arise when AI is used in school projects, mainly when it comes to keeping data safe and knowing how to properly use AI tools. To keep academic and moral standards high, AI experts need to follow strict rules of ethics and think carefully about the results they get. As AI technology gets better, it will probably be easier to use in research methods for teaching. But there still needs to be human control to keep things academically sound and move ideas of educational management forward.

Recommendations

This study shows that teachers and researchers use AI tools like Chat GPT4o and SCI Space in their literature reviews to find gaps in research more quickly and correctly. That is because these tools work as promised and speed up and simplify research, leaving researchers with more time to work on more difficult analysis tasks. To make sure that experts have the right tools to use AI tools, schools should help them improve their tech skills through training programs. To keep academic standards high, this training should teach people how to think critically about AI findings. About the idea, this research says that in the future, AI tools should be used in mixed methods research plans. By putting together quantitative and qualitative data, researchers can get a fuller and more detailed picture of what happens in schools. There should be clear rules about how to use AI properly in school. This is very important from an ethical point of view. Privacy, data protection, and how important it is for people to check AI's work should all be talked about in these rules. They can protect the honor of their work and help the responsible growth of AI technologies in educational research by following these rules of ethics.

Table 4. Proposed Guide in for Evaluating AI Tools in Academic Research

1. Validation and Verification Process	
Cross-Referencing	Implement rigorous cross-referencing procedures to verify the validity and accessibility of AI-generated sources against reputable academic databases.
Manual Validation	Ensure that all identified research gaps and their corresponding sources are manually validated to confirm their relevance and accuracy.
2. Standardized Evaluation Criteria	
Relevance of Research Gaps	Assess whether the identified research gaps address current challenges or underexplored areas in the specific field of study.
Validity of Sources	Evaluate the credibility and accessibility of the sources provided by AI tools.
Consistency of Outputs	Measure the consistency of the AI tools in providing reliable and accurate outputs across multiple queries.
3. Ethical Guidelines	
Data Integrity	Establish protocols to ensure the integrity and confidentiality of the data processed by AI tools.
Transparency	Maintain transparency in the selection and application of AI tools, avoiding biases and conflicts of interest.
Human Oversight	Emphasize the necessity of human oversight in validating AI-generated results to uphold academic rigor and integrity.
4. Training and Digital Literacy	
Educator Training	Develop training programs for educators and researchers to enhance their digital literacy and competence in using AI tools effectively.
Critical Evaluation Skills	Equip researchers with the skills to critically evaluate AI-generated results and integrate them appropriately into their research processes.

5. Performance Scoring System	
Scoring Metrics	Create a scoring system to evaluate the performance of AI tools based on relevance, validity, and consistency of their outputs.
Comparative Analysis	Use the scoring system to conduct comparative analyses of different AI tools, identifying their strengths and limitations.
Practical Implementation of the Framework	
Step 1: Selection of AI Tools	Identify and select AI tools that are relevant to the specific research needs and field of study.
	Ensure the selected tools are capable of generating outputs in the required citation format (e.g., APA 7th edition).
Step 2: Command Standardization	Develop standardized commands for AI tools to ensure uniformity in the prompts given and outputs generated.
Step 3: Data Collection and Organization	Collect and organize AI-generated results systematically for comparison and evaluation.
Step 4: Comparative Analysis	Conduct a comparative analysis using the developed scoring system to assess the performance of each AI tool.
	Document the findings in tabular form to highlight the strengths and limitations of each tool.
Step 5: Recommendations and Best Practices	Provide recommendations for the use of specific AI tools based on their performance in the comparative analysis.
	Share best practices for integrating AI tools into research methodologies to improve efficiency and accuracy.

Implications to University Ethics Review Board

Now that we know what the study found, the University Ethics Review Board is going to change how they make sure that research papers from students, teachers, and staff are honest and well-written. It's not always possible to trust AI tools that are used to find gaps in the study literature. Right away, the Ethics Review Board needs to make it clear how AI can be used in study. Because of these rules, AI results should be compared to past research by hand to make sure that the holes in knowledge found are real and important. The Ethics Review Board should also stress how important it is for people to keep an eye on the study and make sure that AI tools are only used to assist and not in place of thorough academic review. These steps help the Ethics Review Board make sure that research results are correct, encourages ethical research, and upholds the university's high standards for academic success.

Limitations of the Paper

A lot of things are wrong with this study. First, it depends on how smart AI tools are at the moment, which changes all the time. This means that later versions of these tools might not be able to use the results. Second, the study only looks at a few AI tools. It may not look at all AI technologies that are available. Third, the evaluation method is based on how simple it is to find and understand previous research. This might cause bias if some studies are hard to find or are read in the wrong way. They should figure out how to mix more AI tools in the future and keep track of how well they work as they get better. Also, longitudinal studies that look at the long-term benefits of using AI in education research might help us learn more about how well they work and how they can be made better. More study should also be done on how teachers can be trained and taught how to use AI tools effectively. This will help make sure that these technologies are used in a way that is both useful and efficient.

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Table 2. Results of the AI Search Command: *"Provide one methodological Research Literature Gap for Educational Management and provide source in APA 7th edition"*

AI Tool	Identified Research Gap	Source in APA 7th Edition	Manual Validation	Researcher's Remarks
Chat GPT4o	There is a need for more comprehensive studies employing mixed methods research to explore the impact of leadership styles on teacher motivation and student outcomes in diverse educational settings.	Hallinger, P., & Heck, R. H. (2011). Conceptual and methodological issues in studying school leadership effects as a reciprocal process. School Effectiveness and School Improvement, 22(2), 149-173. https://doi.org/10.1080/09243453.2011.565777	The article is valid and accessible in the search engine. https://doi.org/10.1080/09243453.2011.565777	Chat GPT4o provided a research literature gap supported by a valid and accessible source.
Chat GPT4	There is a notable gap in educational management research concerning the integration and systematic evaluation of technology-driven interventions in school administrative processes.	Fernandez, A., & Shaw, G. P. (2020). Administrative challenges and organizational leadership in historical perspective. Journal of Educational Administration, 58(2), 145-162.	No research study found.	Chat GPT4 identified a gap but provided a source that does not exist, indicating a limitation in accuracy.
Chat GPT 3.5	The lack of comprehensive studies examining the effectiveness of utilizing artificial intelligence (AI) and machine learning (ML) algorithms in decision-making processes within educational institutions.	Smith, J. K., & Johnson, A. B. (2020). Bridging the Gap: Exploring the Integration of Artificial Intelligence and Educational Management. Journal of Educational Administration, 45(2), 123-137.	No research study found.	Chat GPT 3.5 highlighted a gap but provided a non-existent source, questioning the validity of the identified gap.

Perplexity AI	The lack of studies examining the impact of social media on teaching and learning critical thinking skills, particularly in Saudi Arabia.	Alsaleh, N. J. (2020). Teaching Critical Thinking Skills: Literature Review. Turkish Online Journal of Educational Technology-TOJET, 19(1), 21-39. https://files.eric.ed.gov/fulltext/EJ1239945.pdf	The article is valid and accessible. https://files.eric.ed.gov/fulltext/EJ1239945.pdf	Perplexity AI identified a gap, but the source does not directly support this gap, affecting reliability.
SCI Space	The lack of focus on functions like Commanding, Coordinating, and Organizing within the Indian School Education System, as most studies predominantly emphasize Planning and Controlling functions.	Sarkar, M. (2020). Management of Indian School Education System-A Select Review of Literature. The International Journal of Management. doi: 10.22552/JIJMR/2020/V6/I2/205281 https://tinyurl.com/22fz5tcu Ali, C. T. (2014). Research methods in education, 7th edition. Studies in Continuing Education. doi: 10.1080/0158037X.2013.874966 https://tinyurl.com/2duzc2mz	The articles are valid and accessible in the search engine. https://tinyurl.com/22fz5tcu https://tinyurl.com/2duzc2mz	SCI Space identified a gap supported by two valid and accessible sources, indicating high accuracy and reliability.
Julius AI	The limited use of longitudinal studies to assess the long-term impacts of educational policies on student outcomes.	Schneider, B., & McDonald, S. K. (Eds.). (2006). Scale-up in education: Ideas in principle (Vol. 1). Rowman & Littlefield Publishers. https://tinyurl.com/25n64dv3	The article is valid and accessible in the search engine. https://tinyurl.com/25n64dv3	Julius AI identified a gap supported by a valid and accessible source, demonstrating effectiveness and accuracy.

Table 3. *Results of the AI Search Command: "Provide one Theoretical Research Literature Gap for Educational Management and provide source in APA 7th edition"*

AI Tool	Identified Research Gap	Source in APA 7th Edition	Manual Validation	Remarks
Chat GPT4o	The need for a deeper understanding of how transformational leadership theories can be adapted and applied in diverse cultural and socioeconomic contexts within educational institutions.	Leithwood, K., & Jantzi, D. (2005). Transformational leadership. In B. Davies (Ed.), The essentials of school leadership (pp. 31-43). SAGE Publications.	The reference is valid and accessible through this link: https://psycnet.apa.org/record/2006-09473-004.	Chat GPT4o provided a relevant and valid research literature gap, well-supported by the source. The source is accessible and confirms the identified gap.
Chat GPT4	The insufficient exploration of the relationship between organizational culture	Cameron, K. S., & Quinn, R. E. (2011). Diagnosing and	The literature presented is located through this link:	Chat GPT4 accurately identified a theoretical gap and provided a valid and accessible

	and change management in educational institutions.	changing organizational culture: Based on the competing values framework (3rd ed.). Jossey-Bass.	https://tinyurl.com/2xe63spn	source. The source supports the need for further theoretical development in the context of educational management.
Chat GPT 3.5	The scarcity of studies exploring the intersection of servant leadership theory and instructional leadership practices.	Greenleaf, R. K. (2002). Servant leadership: A journey into the nature of legitimate power and greatness. Paulist Press.	The reference cited is accessible through this link: https://psycnet.apa.org/record/2003-00935-000, with the suggested citation format: Greenleaf, R. K. (2002). Servant leadership: A journey into the nature of legitimate power and greatness (25th anniversary ed.) (L. C. Spears, Ed.). Paulist Press.	Chat GPT 3.5 provided a valid and accessible source, accurately highlighting a theoretical gap in the literature. The source supports the identified gap and is relevant to the context.
Perplexity AI	The need for more studies focusing on the impact of artificial intelligence (AI) on educational practices and outcomes.	Bonilla-Silva (2017) and Nosanow (2024).	The reference to Bonilla-Silva (2017) is valid, but the mention of Nosanow (2024) is not verifiable.	Perplexity AI identified a theoretical gap but provided sources that do not fully substantiate the identified gap.
SCI Space	The lack of comprehensive studies focusing on the functions of coordinating and commanding within the Indian School Education System.	Sarkar, M. (2020). Management of Indian School Education System-A Select Review of Literature. Jaipuria International Journal of Management Research, 42-47.	The information is accessible through this link: https://www.jetir.org/papers/JETIR2101187.pdf, with the suggested citation format: Sarkar, M. (2020). Management of Indian School Education System-A Select Review of Literature. Jaipuria International Journal of Management Research, 42-47.	SCI Space provided a valid and accessible source, accurately identifying a gap in the exploration of certain management functions within the Indian School Education System. The source supports the identified gap.
Julius AI	The limited use of mixed methods approaches to explore the interplay between quantitative outcomes and qualitative insights in educational settings.	Leithwood, K., & Jantzi, D. (2005). Transformational leadership. In B. Davies (Ed.), The essentials of school leadership (pp.	The mentioned literature is accessible through this link: https://us.sagepub.com/en-us/nam/designing-and-conducting-mixed-methods-research/book241842, with the suggested citation format: Creswell, J. W., &	The mentioned literature is accessible through this link: https://us.sagepub.com/en-us/nam/designing-and-conducting-mixed-methods-research/book241842, with the suggested citation format: Creswell, J. W., &

		31-43). SAGE Publications.	Clark, V. L. P. (2017). Designing and conducting mixed methods research. Sage publications.	Clark, V. L. P. (2017). Designing and conducting mixed methods research. Sage publications.

Novelty Statement

This study is novel in its systematic comparison of multiple AI tools specifically for identifying methodological and theoretical research gaps in educational management, providing unique insights into the reliability and accuracy of these emerging technologies in an academic context. The originality lies in the comparative analysis of six distinct AI tools—*Chat GPT4o, Chat GPT4, Chat GPT 3.5, Perplexity AI, SCI Space,* and *Julius A*I—each tasked with identifying relevant research gaps and providing accurate sources in APA 7th edition format.

Practicality of the method

The comparative analysis method employed in this study is practical for researchers as it offers a structured approach to evaluate the accuracy and reliability of AI tools, ensuring that the identified research gaps and sources are both valid and relevant.

Practical utility of the result

The findings provide valuable guidance for researchers in educational management on selecting reliable AI tools, thereby enhancing the efficiency and accuracy of literature reviews and ensuring the integrity of their research outputs. Possible adopters and users of the study results include educational researchers, university faculty, academic librarians, and institutions looking to integrate AI tools into their research methodologies to improve the accuracy and efficiency of literature reviews and gap analysis.