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Utilizing Ai-Adriven Data Analytics to Improve Learning Outcomes in Educational Psychology

Sri Haryanto[1], Xie Guilin [2], Deng Jiao [3], Yuanyuan Wang [4], M. Yunus Sudirman [5]
[1] *Universitas Sains Al-Qur'an Jawa Tengah, Indonesia*
[2] *University of Science and Technology of Hanoi, Vietnam*
[3] *Universiti Sains Malaysia, Malaysia*
[4] *Yangon University, Myanmar*
[5] *Universitas Muhammadiyah Enrekang, Indonesia*

Corresponding Author: Sri Haryanto E-mail; sriharyanto@unsiq.ac.id

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ABSTRACT

Given the rapid advances in computing capabilities, as well as advances in more sophisticated algorithms, and greater accessibility to AI tools, AI has great potential for innovation in data analytics, such as pattern recognition, classification, clustering, and prediction. Likewise in psychology education, AI-based data analytics will be able to manage data to improve student learning outcomes well. This research was conducted with the aim of seeing how influential it is to utilize AI-based data analytics to improve learning outcomes in educational psychology. Additionally, AI can give teachers more time to concentrate on direct interactions with students and the development of more innovative and effective teaching strategies by automating administrative and assessment tasks. The method used by researchers in researching Utilizing AI-Based Data Analytics to Improve Learning Outcomes in Educational Psychology is to use a quantitative method. The data obtained by researchers was obtained from the results of distributing questionnaires. The distribution of questionnaires carried out by researchers was carried out online using Google From software. The results of data acquisition will also be tested again using the SPSS application. From the research results, it can be seen that AI can accurately predict student academic performance. This can be done by analyzing various factors such as study patterns, class participation, and previous test scores. AI also allows teachers to be proactive in helping their students when they encounter a particular problem. From this research, researchers can conclude that in educational psychology, the use of AI-based data analytics has great potential to improve learning outcomes by personalizing student learning experiences such as, enabling early intervention, improving assessments, increasing operational efficiency, supporting better curriculum development, and offers a customizable learning system.

Keywords: *Learning, Outcomes, Psychology*

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INTRODUCTION

The resources a nation possesses greatly influence the sustainability and progress of its civilization (Yamasaki & Luk, 2018). Apart from adequate natural resources, superior human resources and character are also very important to maintain the continuity and progress of a nation (Stylianou & Zembylas, 2021). One way to create a superior and characterful next generation is to guarantee the quality of the education provided (Bessho et al., 2019). The education provided in the present will determine the life of the country in the future, so it is important to look at what has been done in education (Puspita et al., 2020). This is done to find out the advantages and disadvantages of the world of education so that alternative solutions can be created to overcome these shortcomings.

Previous studies show that as one of the main components of improving the quality of human resources, education plays an important role in the development of the Indonesian state (Miedijensky & Abramovich, 2019). Education can be defined as the learning by a group of people of knowledge, skills, and habits that are passed on from one generation to the next through instruction, training, or research (Pham et al., 2020). Although education is usually done under the guidance of another person, it can also be done independently. In carrying out the educational process, there will be a process of awareness and development of a person which involves interactions between various potentials of a person and their environment, so that it will produce individuals who are able to fulfill their various developmental tasks consciously (Chandransu, 2019).

Meanwhile, educational psychology is a field of psychology that specifically studies individual behavior with the aim of finding various facts, generalizations and psychological theories related to education obtained through certain scientific methods to ensure that the educational process runs well (Begeny et al., 2019). During the awareness process students will discover themselves with their strengths and weaknesses, such as strengths and weaknesses in learning, and discover their world with the possibilities and limitations that exist there (Carrozzino et al., 2019). Educational psychology basically aims to achieve educational goals without ignoring the individual development of students. It is hoped that the use of educational psychology will produce better educational outcomes in terms of cognitive, affective and psychomotor (Garaigordobil, 2023).

In the current development of the world of education, many problems still hinder increasing the effectiveness of education and learning in schools, such as a lack of teaching staff while there are many students, so educators may have difficulty recording the number of students or analyzing the data or grades collected by students (Engler & Shedlosky-Shoemaker, 2019). Therefore, AI can help educators become easier and more able to utilize AI-based data analytics in the educational process, meaning processing and analyzing large amounts of educational data (Begeny et al., 2018). AI

can also help identify student learning patterns, modify teaching materials, and provide relevant feedback (Alvarez et al., 2018). Additionally, the ability to process and analyze large amounts of data allows AI to assist in making decisions and predicting learning outcomes.

One type of artificial intelligence technology is AI. AI is a field of computer science that focuses on creating systems that can perform tasks that normally require human intelligence (Mohseni et al., 2021). AI also includes various techniques and approaches such as machine learning, natural language processing, pattern recognition, and problem solving (Coley et al., 2019). AI is also built on various technologies, such as computer vision, deep learning, and natural language processing. These technologies allow systems to learn from experience, adapting to the input they receive from others (Nadarzynski et al., 2019). With AI, students can learn independently to improve their learning outcomes by exploring and practicing learning skills in educational psychology (Kuziemski & Misuraca, 2020).

AIbased data analytics is a major advancement in educational technology that facilitates learning (Shen et al., 2020). The appropriate and controlled use of technology can speed up the education and learning process. Apart from that, AI can help students become more independent in learning. Teachers are not given such dominant responsibilities, instead, their responsibilities are specifically to provide enlightenment with important keywords in the learning process (Kabudi et al., 2021). Every use of technology by teachers must focus on teaching goals, namely managing student morals and behavior. Meanwhile, for students, utilizing AI-based data analytics can help them to work together or study independently to improve better learning outcomes (Wahl et al., 2018).

In educational psychology, learning outcomes include students' cognitive, affective and psychomotor abilities acquired during the educational process. Three areas can be seen for learning outcomes, namely the cognitive domain including knowledge, understanding, application, research, creation, and evaluation. Meanwhile, the effective domain includes acceptance, response and determining value (Bengio et al., 2021). Then the psychomotor domain includes fundamental, generic, ordinative and creative movements. By utilizing AI-based data analytics, it can be used to analyze student performance data to predict future learning outcomes, determine student needs, and help teachers adjust teaching (Ng et al., 2021). Learning outcomes will have a positive effect if they demonstrate new abilities in students in carrying out assignments and answering questions on the tests given correctly and accurately (Popkova & Sergi, 2020). The increasing use of technology today, technology can help solve various problems, increase productivity, and enable students to make innovations and advances in educational psychology.

The type of method used in this research is a quantitative method. This method is used so that the final results of the processed data can be known clearly and precisely

regarding Utilizing AI-Based Data Analytics to Improve Learning Outcomes in Educational Psychology. The data collection process was obtained by the researcher from the results of the respondents' answers that the researcher had carried out. Researchers created a questionnaire with 10 questions, then distributed it via Goggle from. After the data is collected, the data will be calculated into a percentage and presented in table form. In processing research data, researchers use SPSS software which aims to make it easier for researchers to process data, and the data results are more relevant (Gao et al., 2019). Furthermore, the researcher really hopes that the next researchers will research and study more deeply regarding Utilizing AI-Based Data Analytics to Improve Learning Outcomes in Educational Psychology.

RESEARCH METHOD

Research Design

In examining research on Utilizing AI-Based Data Analytics to Improve Learning Outcomes in Educational Psychology, using quantitative methods (Antun et al., 2020). The aim of using quantitative methods is to collect research data and test the hypotheses that have been formulated. Then the researchers created a questionnaire created in the Google From application which was distributed online to respondents via the WhatsApp application. The questionnaire contained 20 questions asked by the researcher. To fill out the questionnaire, the researcher has provided four options, namely strongly agree, agree, disagree and disagree. So respondents can respond to the questions asked by the researcher by selecting these four options.

Research procedure

In this research, researchers investigated utilizing AI-based data analytics to improve learning outcomes in educational psychology. The aim of the researcher is to investigate this matter so that the researcher can collect, analyze and provide understanding of the data that has been collected. In making questions, the researcher used good language that was easy for respondents to understand when filling out the questionnaire distributed by the researcher later (Wang et al., 2020). This aims to ensure that respondents who provide responses to questions asked by researchers can be answered quickly. That way, it will be easier for researchers to test the data being investigated regarding Utilizing AI-Based Data Analytics to Improve Learning Outcomes in Educational Psychology.

Research subject

In researching the use of AI-based data analytics to improve learning outcomes in educational psychology, researchers of course determine the subjects for their research. In this research, the subject of this research is aimed at all students from educational institutions. Before distributing the questionnaire by the researcher, the researcher asked the respondents first to be willing to spend their time filling out the questionnaire that the researcher would distribute. The questionnaire contains 10 questions each. Using AI-Based Data Analytics to Improve Learning Outcomes in Educational Psychology.

Research Ethics

In writing an article entitled Utilizing AI-Based Data Analytics to Improve Learning Outcomes in Educational Psychology, it is very important for researchers to make strong ethical considerations when writing this article. Where researchers maintain a balance in conducting research so that they remain consistent and careful. This aims to gain trust and readiness from the respondents or those who are the objects of this research (Elish & Boyd, 2018). In addition, researchers also provide actual information about their research to maintain their commitment. Researchers do this in order to obtain maximum research results, and remain consistent in developing better research patterns with the research they conduct.

Data Collection and Analysis

This time, the researcher used quantitative methods to collect research data. The researcher also used a T-test as previously mentioned by the researcher. The purpose of this data collection is to find relationships and become a benchmark between research object materials regarding the title Using AI-Based Data Analytics to Improve Learning Outcomes in Educational Psychology, by collecting the results of respondents' answers from 20 students (Brown & Sandholm, 2018). Researchers also carried out tests first using SPSS software to ensure that respondents' responses were very accurate and reliable. Thus, researchers must be very careful when collecting processed data.

Table 1

Category Utilizing AI-Based Data Analytics to Improve Learning Outcomes in Educational Psychology

no	Earning category	Value interval
1	Strongly agree	>90%
2	Agree	40-80%
3	Disagree	25%-50%
4	Don't agree	0-30%%
Total		100%

Figure 1

Data Collection and Analysis Flow

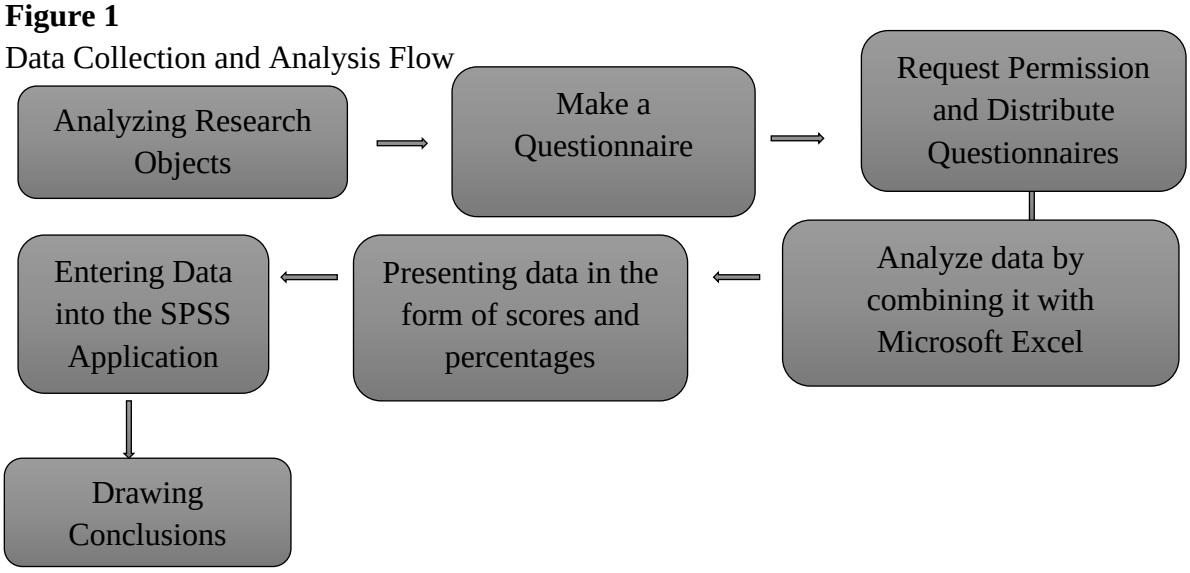

Figure 1 above shows how researchers collect and analyze research data. The results of data acquisition came from respondents' answers to the researcher's questions. Furthermore, in the quantitative research method, the researcher will also test again using the T-test which will be used to enter research data into the SPPS application. The number of questions asked by the researcher was 20 questions, where each question was divided into ten questions with different questions. Only after the questionnaire is distributed can researchers formulate and draw conclusions from the research object.

RESULTS

Utilizing AI-Based Data Analytics to Improve Learning Outcomes in Educational Psychology

Artificial intelligence-based data analytics can be used in the education industry to analyze transaction data and predict student behavior, enabling the development of better strategies to improve learning outcomes. Apart from that, artificial intelligence-based data analytics can also help in optimizing the learning process and increasing educational efficiency. Educational organizations can use these data analytics to find areas for improvement and optimize them. In educational psychology, AI-based data analytics can be used to analyze very large and complex data, such as transcription data, more efficiently and effectively, allowing users to gain deeper and more accurate insights from the data collected.

Table 2

Summary of Percentage Results from Respondents' Answers

No.	question	Strongly Agree	Agree	Disagree	don't agree
1	AI-based data analytics can help improve learning outcomes by analyzing student data more effectively and efficiently, predicting student behavior, and providing more accurate feedback.	30%	50%	10%	10%
2	The benefits of using AI-based data analytics in educational psychology include increasing the efficiency and effectiveness of the education system, improving the quality of education, and increasing student abilities.	35%	65%	0%	0%
3	AI-based data analytics can help in managing student data by analyzing data more quickly and accurately, predicting student behavior, and providing more accurate feedback.	40%	55%	5%	0%
4	Challenges faced in implementing AI-based data analytics in educational psychology include issues of data privacy and security,	40%	50%	5%	5%

	increasing technical capabilities and use of data, as well as ethical and social issues that arise from the use of such technologies.				
5	AI-based data analytics can help in increasing student engagement by analyzing student data more effectively and efficiently, predicting student behavior, and providing more accurate feedback.	60%	35%	3%	2%
6	AI has great potential to improve the efficiency and effectiveness of education systems by analyzing data more quickly and accurately, predicting student behavior, and providing more accurate feedback.	50%	40%	7%	3%
7	AI-based data analytics can help improve the quality of education by analyzing data more effectively and efficiently, predicting student behavior, and providing more accurate feedback.	35%	55%	8%	2%
8	The benefits of using chatbots in educational psychology include helping students solve problems, providing round-the-clock feedback, and increasing the efficiency and effectiveness of educational systems	55%	35%	5%	5%
9	AI-based data analytics can help improve students' abilities by analyzing data more effectively and efficiently, predicting student behavior, and providing more accurate feedback.	40%	60%	0%	0%
10	Challenges faced in integrating AI in education include protecting student data and privacy, improving technical capabilities and data use, as well as ethical and social issues that arise from the use of the technology.	50%	35%	10%	5%

Table 2 above shows the distribution of questionnaires that have been carried out by researchers. This questionnaire contains ten questions about utilizing AI-based data analytics to improve learning outcomes in educational psychology. Apart from that, during the distribution of the questionnaire, researchers have presented a percentage of each response from the respondents. Therefore, respondents can choose to answer the researcher's questions by providing options such as strongly agree, agree, disagree, or disagree. And it can also be seen from the first question asked by researchers regarding AI-based data analytics can help improve learning outcomes by analyzing student data

more effectively and efficiently, predicting student behavior, and providing more accurate feedback, getting the highest score of 50%. agree.

The second question about the benefits of using AI-based data analytics in educational psychology includes increasing the efficiency and effectiveness of the education system, improving the quality of education, and increasing student abilities, getting a percentage result of 0% disagree. The third question about AI-based data analytics can help in managing student data by analyzing data more quickly and accurately, predicting student behavior, and providing more accurate feedback, getting a score of 55% agree. The fourth question about the challenges faced in implementing AI-based data analytics in educational psychology includes issues of data privacy and security, increasing technical capabilities and data use, as well as ethical and social issues that arise from the use of this technology. get a percentage gain of 50% agree. Next is the fifth question. A better understanding of AI-based data analytics can help increase student engagement by analyzing student data more effectively and efficiently, predicting student behavior, and providing more accurate feedback. There are as many as 60% of the strongly agree option. Furthermore, the sixth regarding AI has great potential to increase the efficiency and effectiveness of the education system by analyzing data more quickly and accurately, predicting student behavior, and providing more accurate feedback thereby improving the quality of school facilities, as many as 7% disagree.

The seventh question is that AI-based data analytics can help improve the quality of education by analyzing data more effectively and efficiently, predicting student behavior, and providing more accurate feedback. get a percentage result of 55% choosing the agree option.

In the eighth question, the benefits of using chatbots in educational psychology include helping students solve problems, providing feedback over time, and increasing the efficiency and effectiveness of the education system, also found in the agree option of 35%. The ninth question regarding AI-based data analytics can help improve students' abilities by analyzing data more effectively and efficiently, predicting student behavior, and providing more accurate feedback, getting a percentage result of 60% who agree. For the final question regarding the challenges faced in integrating AI in education including protecting student data and privacy, increasing technical capabilities and use of data, as well as ethical and social issues that arise from the use of this technology, the percentage obtained was 50% for the strongly agree option.

Table 3

Summary of Percentage Results from Respondents' Answers

No.	question	Strongly Agree	Agree	Disagree	don't agree
1	AI-based data analytics can help in improving student academic performance by analyzing data more effectively and efficiently, predicting student behavior, and	30%	45%	15%	10%

	providing more accurate feedback.				
2	AI has great potential to improve students' adaptability by analyzing data more quickly and accurately, predicting student behavior, and providing more accurate feedback.	60%	30%	8%	2%
3	AI-based data analytics can help in improving the efficiency of statistical computing by analyzing data more quickly and accurately, predicting student behavior, and providing more accurate feedback.	55%	35%	5%	5%
4	The benefits of using a student engagement analysis system in educational psychology include helping teachers understand and increase student engagement in the learning process.	45%	45%	8%	2%
5	AI-based data analytics can help improve students' ability to solve problems by analyzing data more effectively and efficiently, predicting student behavior, and providing more accurate feedback.	50%	45%	3%	0%
6	Develop policies and procedures for secure data storage and processing including ethical and social issues, data protection and student privacy, improving technical capabilities and data applications.	60%	40%	0%	0%
7	Artificial intelligence-based data analytics can predict student behavior and provide more accurate feedback, improving students' ability to adapt to change.	30%	60%	7%	3%
8	Analyzing data more quickly and accurately, providing more accurate feedback, and predicting student behavior, AI has great potential to improve students' critical thinking abilities.	40%	50%	6%	4%
9	Artificial intelligence-based data analytics can predict student behavior, provide more accurate feedback, and analyze data more efficiently, which can help improve students' communication skills.	45%	55%	0%	0%

10	Developing comprehensive policies and protocols for the use of AI in education involves issues such as the protection and privacy of student data, improving technical capabilities and data use, and ethical and social issues.	45%	50%	5%	0%

In the statement in table 3 above, the researcher has also created ten questions. Which can be seen from the first question regarding AI-based data analytics which can help improve student academic performance by analyzing data more effectively and efficiently, predicting student behavior, and providing more accurate feedback, getting a percentage result of 45% agree option. Next, question number two about AI has great potential to increase students' adaptability by analyzing data more quickly and accurately, predicting student behavior, and providing more accurate feedback, getting a percentage score of strongly agree option of 60%. The third question that AI-based data analytics can help in increasing the efficiency of statistical computing by analyzing data more quickly and accurately, predicting student behavior, and providing more accurate feedback received a percentage score of 55% strongly agree.

The fourth question regarding the benefits of using a student engagement analysis system in educational psychology includes helping teachers understand and increase student engagement in the learning process, getting a 45% percentage score in the agree option. The fifth question regarding AI-based data analytics can help improve students' ability to solve problems by analyzing data more effectively and efficiently, predicting student behavior, and providing more accurate feedback, getting as many as 50% of strongly agree options. The sixth question, developing policies and procedures for safe data storage and processing, including ethical and social issues, data protection and student privacy, increasing technical capabilities and data applications, also received a percentage gain of 40% in the agree option.

Furthermore, the seventh regarding artificial intelligence-based data analytics can predict student behavior and provide more accurate feedback, increasing students' ability to adapt to change, getting a percentage score of 30% strongly agree. The eighth question was about Analyzing data more quickly and accurately, providing more accurate feedback, and predicting student behavior. AI has great potential to improve students' critical thinking abilities, getting a percentage gain of 40% strongly agree. In question number nine, artificial intelligence-based data analytics can predict student behavior, provide more accurate feedback, and analyze data more efficiently, which can help improve students' communication skills. The highest number of strongly agree options was also found at 45%. The final question about Developing comprehensive policies and protocols for the use of AI in education involving issues such as the protection and privacy of student data, improving technical capabilities and use of data, and ethical and social issues, had 45% strongly agree.

Diagram 1

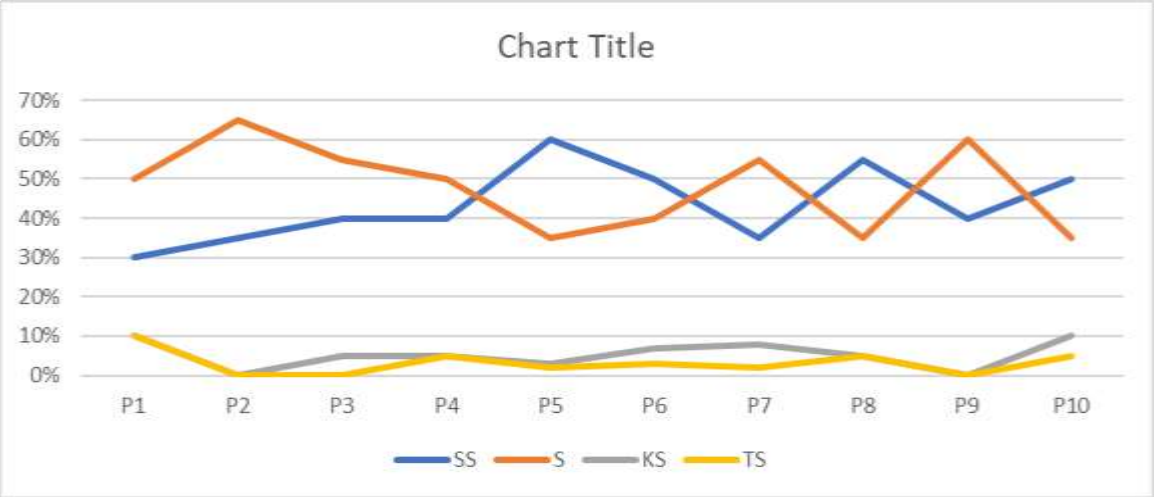

Diagram 2

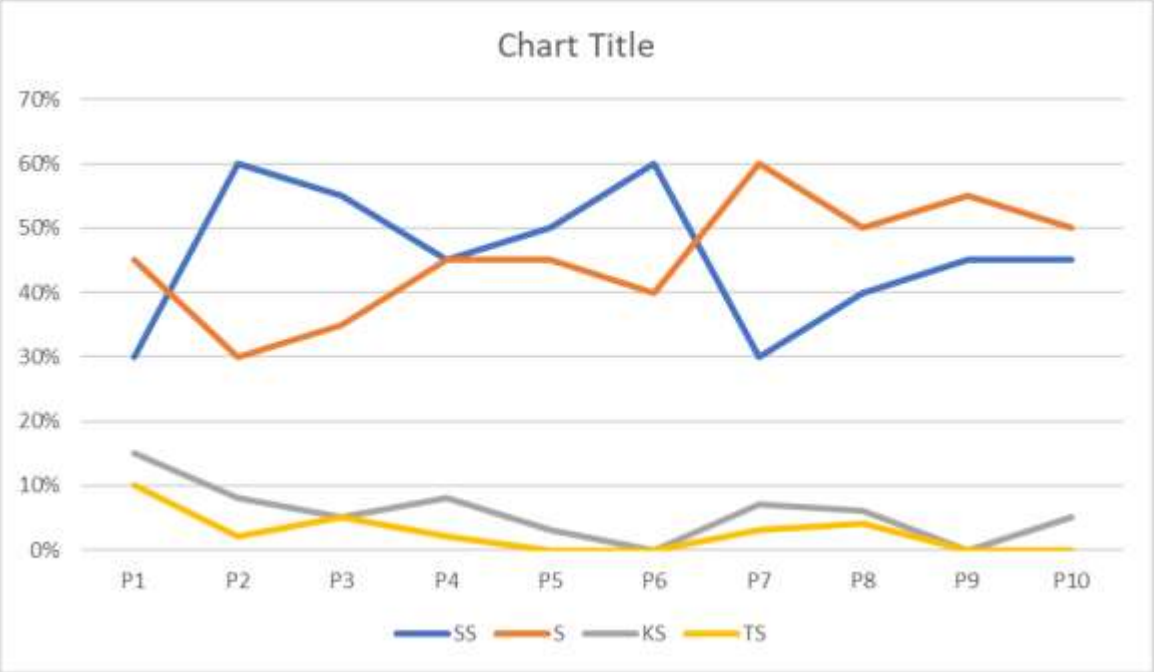

Table 3

T-test Regarding Utilizing AI-Based Data Analytics to Improve Learning Outcomes in Educational Psychology

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRE TST	44.7500	20	10.06231	2.25000
	POST TEST	46.7500	20	9.90415	2.21463

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	PRE TST & POST TEST	20	-.788	.000

Paired Samples Test

		Paired Differences				
					95% Confidence Interval of the Difference	
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper
Pair 1	PRE TST - POST TEST	-2.00000	18.87633	4.22088	-10.83439	6.83439

Based on the results of table 3 above, it is a T-test using the SPSS application. From the research results, the researcher can conclude that the T-test in the first output section explains the mean as the average. In the Pre Test the average number produced was 44.7500, while in the Post Test the result was 46.7500. Based on these results, it can be formulated that there are differences in the results of the respondents' answers. Next, in the Paired Samples Correlations section, you get a correlation of -.788, and the sign size is 000. Next, in the Paired Samples Test section, we obtained a result of 18.87633 in the Std section. Deviation, while in the Std. Error Mean obtained a result of 4.22088. Based on these results, regarding utilizing AI-based data analytics to improve learning outcomes in educational psychology.

Table 4

T-test Regarding Utilizing AI-Based Data Analytics to Improve Learning Outcomes in Educational Psychology

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRE TEST	5.5000	20	3.90007	.87208
	POST TEST	2.9000	20	3.09329	.69168

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	PRE TEST & POST TEST	20	.768	.000

Paired Samples Test

		Paired Differences				
					95% Confidence Interval of the Difference	
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper
Pair 1	PRE TEST - POST TEST	2.60000	2.50053	.55913	1.42972	3.77028

Furthermore, in table 4, there are also the results of research using the T-test. It can be seen in the first output section that the Pre Test results were 5.5000, and the Post Test results were 2.9000. In the Paired Samples Correlations section, we obtained a correlation of .768, with a sign result of .000. Meanwhile, in the Paired Samples Test section, the results were 2.50053 in the Std section. Diviation, and Std. The mean error is .55913. Based on the results of this research, it can be seen between each question asked by researchers regarding utilizing AI-based data analytics to improve learning outcomes in educational psychology.

DISCUSSION

AI is the abbreviation of "Artificial Intelligence" in Indonesian (Shneiderman, 2020). In short, artificial intelligence is a technology intended to give computer systems the ability to imitate human intellectual abilities. AI can learn from data and experience (Mohseni et al., 2021b). To solve problems and make decisions, AI can also use reasoning and logic, can understand human language, images, and sounds, and can adapt to new situations (Akter et al., 2022). AI can save time and effort in paragraphing by speeding up text analysis, producing relevant, quality content, and providing grammar suggestions and corrections (B. Wang et al., 2021). AI can also improve the quality of paragraphs by producing content that is more informative and arouses user interest (Campbell et al., 2020).

Apart from predetermined limitations, artificial intelligence can develop ethical and legal aspects, such as how artificial intelligence can affect the quality and authenticity of writing, as well as copyright for the work it produces (Glikson & Woolley, 2020). One important indicator for evaluating the effectiveness of the teaching and learning process is learning outcomes (Bacchi et al., 2020). By knowing learning outcomes, teachers and learners can determine whether the learning objectives have been achieved or not (Kang & Kim, 2021). Learning outcomes can also be used to improve the quality of learning in the future(Zheng & Zhang, 2020). Ability to

understand and remember information, skills, Ability to act well and appropriately (Dolce et al., 2020). Attitude is a person's tendency to behave in a certain way under certain conditions.

A person's personal view of what is right and wrong is known as values (Blackledge, 2021). Cognitive domain (thoughts and understanding), affective domain (feelings and emotions), and psychomotor domain (physical skills) (Ivanova et al., 2022). Tests are a way to measure students' knowledge and skills (Soltanimehr et al., 2019). Performance assessment involves looking at how students perform certain tasks (Li & Yao, 2020). At various levels of learning personalization, AI (Artificial Intelligence) based data analytics offers many opportunities to improve learning outcomes (Hao et al., 2020). AI can analyze student data, including learning styles, strengths, and weaknesses, to create personalized learning experiences (Sun et al., 2020). Teachers can use these recommendations to provide learning materials that suit each student's needs and interests, which can increase student motivation and engagement and help them reach their full potential (Zhao et al., 2020).

Analyzing student data patterns, AI can spot students who may be experiencing learning difficulties (Wichmann et al., 2020). Teachers can intervene immediately and help struggling students to prevent them from falling behind (Jones-Jang et al., 2021). AI can help teachers create lesson plans and learning materials, enabling them to be more productive and effective in teaching, and enabling them to automate administrative tasks such as grading and note-taking, so teachers can focus on interacting with their students (Claassen, 2020). This can help increase graduation rates and reduce the number of students leaving school (Nielsen et al., 2021). AI can provide students with faster and more accurate feedback about their assignments and progress. This feedback can help students understand where they excel and where they need to improve(Çop et al., 2021).

AI has the ability to analyze overall learning data to find patterns and trends. This information can help schools and teachers make better choices about programs, instruction, and resources (Schmitz et al., 2019). Educational psychology is a field of psychology that studies the processes and patterns of individual behavior in educational contexts. Educational psychology helps teachers understand how students learn and helps them create better teaching methods (Gerlach et al., 2021). Educational psychology helps teachers understand how students learn, so they can create more effective teaching methods (Planey et al., 2019). Give them the tools and strategies they need to learn effectively.

Educational psychology can help teachers understand how students learn, so they can develop more effective teaching methods (Putz et al., 2020). Educational psychology can help schools create better learning environments (Andel et al., 2020). AI can help teachers create lesson plans and learning materials, enabling them to be more productive and effective in teaching, and enabling them to automate administrative tasks such as grading and note-taking, so teachers can focus on interacting with their students (Walton & Yeager, 2020). AI has the ability to analyze

overall learning data to find patterns and trends. This information can help schools and teachers make better decisions about resources, curriculum, and instruction (Ralph et al., 2020). This can help improve the overall quality of education.

CONCLUSION

Ai-based data analysis can improve educational psychology learning outcomes in a more effective and efficient way. This technology allows data analysis to be carried out more quickly and accurately, enabling teachers and researchers to understand student learning patterns and trends better and provide more specific and effective attention to these students. Educational psychology and artificial intelligence-based data analytics: leading to more effective learning. In educational psychology, ai-based data analytics is opening new doors. This allows teachers to understand students' unique learning patterns and adapt learning to meet their needs.

It has the potential to improve student engagement, motivation and overall learning outcomes. Teachers can provide quick support and intervention when they discover students who may be experiencing learning difficulties. Faster, more accurate feedback that is based on data helps students understand where they are lacking and encourages them to improve.

Although artificial intelligence-based data analytics is still very new, it has great potential to transform learning. By considering ethics and data privacy, and involving parents and teachers in the process, AI can be a powerful tool for support.

AI-based data analysis can improve students' educational psychology learning outcomes by improving their analytical and critical thinking skills. A problem-based analytical-synthetic approach can help students express concepts and solve problems through analysis and synthesis of information. Electronic modules based on this approach enable students to study remotely and increase their interest in mathematics. Apart from that, the application of inquiry and the POE model can increase students' learning activities and analytical abilities. Triangulation data can be used to increase learning activity and student learning outcomes. These results indicate that AI-based data analysis can be a useful strategy for improving educational psychology learning outcomes.

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