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Students' Memory Ability: The Use of Prompt-Based Artificial Intelligence in Learning

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ABSTRACT
This study examines students' memory ability through the use of prompt-based artificial intelligence (AI) in learning. The background of this research is the increasing utilization of AI by students to complete academic tasks, which may reduce their attention to teachers' explanations and lead to superficial learning processes. The main problem identified is the declining interest of students in independently training their memory skills, resulting in suboptimal long-term cognitive development. Therefore, this study aims to identify implementation strategies of AI in learning and to analyze the effect of prompt-based AI usage on students' memory ability. This research employed a quantitative approach with a quasi-experimental method using a Nonequivalent Control Group Design. The sample consisted of 72 students selected from a population of 319 students at SMA Negeri 1 Kedungadem through probability random sampling. Data were collected through observation, pre-test and post-test instruments, documentation, and Likert-scale questionnaires. Data analysis was conducted using a paired sample t-test with the assistance of SPSS version 26. The findings reveal that prompt-based AI media significantly improved students' memory ability in sociology learning for classes XI-7 and XI-8. The mean pre-test score increased from 59.56 to 69.42 in the post-test, with a significance value of 0.000 < 0.05, indicating that the research hypothesis was accepted. The novelty of this study lies in highlighting the role of prompt-based AI not only as a learning support tool but also as a medium to enhance concentration, strengthen memory retention, and promote students' learning independence. Thus, AI can be utilized as a balanced learning medium that integrates technology, cognitive function, and social interaction.

Keywords: artificial intelligence, prompt-based learning, memory ability.

INTRODUCTION
The digital revolution has now entered the era of Artificial Intelligence (AI). Society, especially students, has experienced significant changes in seeking information. The way they access, store, and remember information has also evolved (Nur Inayati, 2016). Unlike in the past, when one had to open a book to find answers, today it is sufficient to use Google Assistant or AI-based platforms such as ChatGPT to obtain numerous answers more quickly, without the need to flip through pages or construct responses manually.

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These changes bring various conveniences; however, technological advancements also introduce new challenges that cannot be ignored, particularly concerning cognitive abilities, especially long-term memory among students (Mubarok Muh. Arkham Januar, 2022). This condition has ultimately given rise to a phenomenon known as "Digital Amnesia." Digital Amnesia refers to the tendency of individuals to forget information because they rely heavily on technological intelligence to store and recall various kinds of information (Oktafia et al., 2025).

Instant access to information makes students reluctant to remember information or learning material delivered by teachers, resulting in a shallow learning process (Julianti et al., 2025). Excessive reliance on Artificial Intelligence (AI) in completing daily tasks can reduce cognitive function (Syawaudin et al., 2025). Consequently, this tendency may lead to the formation of a passive generation. Adolescents who depend too heavily on technology may experience a decline in the quality of interpersonal interactions (Aelia Suci Nurangraini, Syamsir Syamsir, zizh Jumaita Ayu, Cynthia Bunga Belia, Dea Kartika, 2025). Therefore, cognitive awareness is needed so that students do not become overly dependent on AI and can develop an active learning process.

A survey conducted by Tirto in collaboration with Jakpat shows that 86.21% of respondents use Artificial Intelligence (AI) to complete assigned tasks (Hartanto Alfons Yoshio & Rohmah Nailur Fina, 2024). Similar findings were observed in another survey of 61 respondents, indicating that AI usage influences the learning process of high school and vocational school students (Adabil et al., 2025). Other data state that, according to the Minister of Communication and Digital Affairs, 87% of Indonesian students use AI to complete school assignments (Wawan s, 2024). These figures indicate a high level of student dependence on AI technology in learning activities. Artificial Intelligence (AI) should be used as a supporting tool rather than replacing human cognitive functions, and it should complement the learning process rather than become the center of cognitive and social activities.

Based on these issues, high school students are among the groups most affected by the development of Artificial Intelligence, particularly in the use of prompt-based AI in the learning process. This condition makes research on the use of prompt-based Artificial Intelligence relevant and important to conduct, especially to determine the extent to which dependence on AI can affect students' memory abilities.

METHOD

This study employs a quantitative approach with a quasi-experimental design of the Nonequivalent Pretest–Posttest Control Group Design type. The research was conducted from March to September 2025 at SMA Negeri 1 Kedungadem, Bojonegoro Regency, East Java. The research subjects were eleventh-grade students who actively use digital devices in learning. The population consisted of 319 students, with a sample of 72 students selected using purposive sampling. The sample included class XI-7 as the experimental group and XI-8 as the control group, each consisting of 36 students.

The experimental group was given treatment in the form of learning using prompt-based Artificial Intelligence, while the control group used conventional learning methods. The treatment was conducted over 12 meetings in the Sociology subject. The research instrument consisted of a written multiple-choice test with 30 questions, used as both the pre-test and post-test to measure students' memory ability. In addition, supporting data were collected through observation, documentation, and a Likert-scale questionnaire to measure students' mastery of AI prompts in learning. The tools used included laptops or smartphones with internet access, prompt-based AI applications, and SPSS software version 26 for data analysis.

Data were analyzed using descriptive statistics. The prerequisite tests included a normality test

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using Shapiro–Wilk and a homogeneity test using Levene's test. Hypothesis testing was conducted using a paired sample t-test with a significance level of 0.05 to determine differences in students' memory abilities before and after the treatment.

RESULT AND DISCUSSION

Students' Memory Ability in the Experimental Class

Table 1. Descriptive Statistics of Students' Pre-test Scores

Descriptive Statistics

	N	Range	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
PRETEST	36	20	50	70	2144	59.56	.928	5.567	30.997
Valid N (listwise)	36								

Based on the descriptive analysis results in Table 1, it was found that the number of students who participated in the pre-test was 36. The score range was 20, with a minimum score of 50 and a maximum score of 70. The total score obtained by the students was 2,144, with an average (mean) of 59.56. This indicates that, in general, students' memory ability before being given treatment using prompt-based AI media was still in the moderate category.

In addition, the standard deviation of 5.567 and variance of 30.997 indicate a fairly wide distribution of scores among the students. Some students were still in the very low category, while a small number had already reached the very high category. Therefore, the pre-test results confirm that the majority of students had not yet achieved an optimal level of memory ability.

Table 2. Descriptive Statistics of Students' Post-test Scores

Descriptive Statistics

	N	Range	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
POSTTEST	36	25	57	82	2499	69.42	1.018	6.106	37.279
Valid N (listwise)	36								

Based on the results of the post-test descriptive analysis, the mean score was 69.42, with a minimum score of 57 and a maximum score of 82. The standard deviation of 6.106 indicates a moderate variation among students in their learning outcomes after using prompt-based AI media. Compared to the pre-test scores, there was an increase in the average score of 9.86 points (from 59.56 in the pre-test to 69.42 in the post-test). This indicates that the use of prompt-based AI media is quite effective in improving students' memory ability.

Furthermore, the distribution of post-test results shows that most students were in the moderate to good categories, with 44.5% of students in the moderate category, 33.5% in the good category, and 5.6% reaching the very good category. Interestingly, no students fell into the very low category in the post-test, in contrast to the pre-test results where low scores were still found. This finding confirms that prompt-based AI media can help students better understand the material and strengthen their memory in learning Sociology.

Students' Memory Ability in the Control Class Using Conventional Methods

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Tabel 3. Descriptive Statistics of Students' Pre-test Scores

Descriptive Statistics

	N	Range	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
PRETEST	36	20	50	70	2198	61.06	1.089	6.533	42.683
Valid N (listwise)	36								

Based on the results of the descriptive analysis in Table 3, it was found that the number of students who participated in the pre-test was 36. The score range was 20, with a minimum score of 50 and a maximum score of 70. The total score obtained by the students was 2,198, with an average (mean) of 61.06. This indicates that, in general, students' memory ability before being given treatment using prompt-based AI media was still in the moderate category.

In addition, the standard deviation of 6.533 and variance of 42.683 indicate a fairly wide distribution of scores among the students. Some students were still in the low category, while a small number had already reached the high category. Therefore, the pre-test results confirm that the majority of students had not yet achieved an optimal level of memory ability.

To determine whether the use of conventional methods was effective in improving the memory ability of students in class XI-8 (control group), the researcher provided treatment over two meetings. After applying the treatment in each session using prompt-based AI media, the researcher then conducted a post-test (final test) to determine whether the conventional method was effective in improving the memory ability of students in class XI-8 in understanding and mastering the given learning material.

Table 4. Descriptive Statistics of Students' Post-test Scores

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
POSTTEST	36	22	53	75	63.44	1.147	6.880	47.340
Valid N (listwise)	36							

Based on the results of the descriptive analysis in Table 4, it was found that the number of students who participated in the post-test was 36. The range of scores obtained was 22, with a minimum score of 53 and a maximum score of 75. The mean score of the post-test was 63.44, indicating an improvement in students' abilities after being given treatment using AI-based prompt media.

In addition, the standard deviation of 6.880 and the variance of 47.340 indicate a moderate level of variation in learning outcomes among the students. When compared to the pre-test mean score of 61.06, there is an increase of 2.38 points. This improvement suggests that the use of AI-based prompt media contributes positively to enhancing students' memory abilities.

The distribution of post-test scores also shows that most students fall into the fair to good category, and no students are categorized as very low. This differs from the pre-test results, where some students were still in the low category. Therefore, the post-test results confirm that the implementation of AI-based prompt media helps students better understand the material and improves their memory in the learning process.

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Data Analysis

Normality Testing

Tabel 5. Normality Test of Pre-Test and Post-Test

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre-Test (Kontrol)	.127	37	.138	.932	37	.025
Post-Test (Kontrol)	.121	37	.187	.937	37	.037
Pre-Test (Intervensi)	.111	37	.200*	.966	37	.306
Post-Test (Intervensi)	.211	37	.000	.609	37	.000

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Based on the results of the normality test using the Shapiro–Wilk method, it was found that the control pre-test had a significance value of 0.025 < 0.05, indicating that the data were not normally distributed. Furthermore, the control post-test showed a significance value of 0.037 < 0.05, which also indicates a non-normal distribution. Meanwhile, the normality test results for the intervention pre-test showed a significance value of 0.306 > 0.05, indicating that the data were normally distributed. However, the intervention post-test had a significance value of 0.000 < 0.05, indicating that the data were not normally distributed.

Thus, it can be concluded that most of the research data, both in the control and intervention groups, were not normally distributed. Only the intervention pre-test data met the normality assumption. Therefore, in the subsequent analysis stage, non-parametric statistical tests were used to ensure more accurate research results.

Homogeneity Test

In this study, the homogeneity test was conducted using Levene's Test through SPSS version 26. The following are the results of the homogeneity test for the students' pre-test and post-test:

Tabel 6. Homogeneity Test of Pre-Test and Post-Test

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Hasil Belajar Sosiologi	Based on Mean	2.782	1	70	.100
	Based on Median	2.587	1	70	.112
	Based on Median and with adjusted df	2.587	1	67.910	.112
	Based on trimmed mean	2.793	1	70	.099

Based on the results of the variance homogeneity test shown in Table 19, the significance value in the based on mean row is 0.100 > 0.05. This result indicates that the Sociology learning outcomes data between the control and intervention groups have equal variances or are homogeneous. In addition, the results for based on median (0.112 > 0.05), based on median and with adjusted df (0.112 > 0.05), and based on trimmed mean (0.099 > 0.05) also consistently indicate that the data are homogeneous.

Thus, it can be concluded that the Sociology learning outcomes data in this study meet the assumption of homogeneity, making them suitable for further statistical testing.

Hypothesis Testing

The Independent Sample T-Test was conducted to determine whether there is a difference in the post-test results between students in the control class and the experimental class. The results of the hypothesis testing are presented in the following table:

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Tabel 7. Group Statistick

Group Statistics

	Nilai	N	Mean	Std. Deviation	Std. Error Mean
Hasil Belajar	1	36	63.44	6.880	1.147
	2	36	69.42	6.106	1.018

Tabel 8. Independent Sample T-Test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Hasil Belajar	Equal variances assumed	2.782	.100	-3.895	70	.000	-5.972	1.533	-9.030	-2.914
	Equal variances not assumed			-3.895	69.024	.000	-5.972	1.533	-9.031	-2.914

Based on the table above, the value in the Sig. (2-tailed) column shows a significance level smaller than 0.05 (0.000 < 0.05). Therefore, it can be concluded that H_0 is rejected and H_a is accepted. This indicates that there is a difference in the average memory ability between students who used prompt-based Artificial Intelligence (AI) media and those who used conventional media.

Discussion

In the implementation of this study, the researcher first conducted a pre-test on students in the experimental class. Subsequently, the researcher provided treatment during the learning process using prompt-based AI media. After administering the pre-test and identifying the students' memory abilities, the next stage was to carry out the treatment.

Based on the research timeline described above, the first step was administering the pre-test, followed by the treatment, and then the post-test. The treatment was conducted over 12 sessions, with each session lasting 12 × 40 minutes. After completing the treatment, a post-test was administered.

1. Students' Memory Ability Using Prompt-Based AI Media

   Based on the research data, it can be concluded that students' memory ability using prompt-based Artificial Intelligence (AI) in sociology learning was initially still low. This can be seen from the pre-test results, where the average score increased from 59.56 to 69.42 in the post-test. In the pre-test, most students were unable to answer the questions correctly.
2. Students' Memory Ability in Class XI-8 Using Conventional Methods

   After the implementation of the study, the researcher was able to address the research problem, showing that students' memory ability in learning sociology using conventional methods also improved to some extent. Based on the research data, it can be concluded that the improvement in memory ability using conventional methods was relatively small, as indicated by the increase in the average score from 61.06 to 63.44. This result can be observed from the students' answers in the post-test.

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3. The Effectiveness of Prompt-Based AI Media in Improving Students' Memory Ability

The implementation of prompt-based Artificial Intelligence (AI) can improve students' memory ability. This is evident from the students' enthusiasm during sociology learning. The use of prompt-based AI media has proven effective in improving memory ability in class XI-7 at SMAN 1 Kedungadem, as indicated by a significant increase in scores. The average pre-test score was 59.56, while the post-test average increased to 69.42. This is further supported by the hypothesis test results, which showed a significance value of 0.000, meaning it is smaller than 0.05; therefore, the hypothesis is accepted. Additionally, the use of AI helps students manage their concentration in determining the correct answers.

CONCLUSION

Based on the results and discussion of the study on Students' Memory Ability: The Use of Prompt-Based Artificial Intelligence in Learning, it can be concluded that the use of prompt-based Artificial Intelligence (AI) media has a positive impact on students' memory ability in sociology learning. Prior to the implementation of prompt-based AI, students' memory ability tended to be in the low category, indicating that the learning process had not been optimal in training memory retention and students' learning concentration.

After the implementation of prompt-based AI media, students' memory ability showed a significant improvement and reached a high category. This indicates that the use of prompts in AI can help students focus their attention, process information more actively, and strengthen their memory of the learning material. The results of hypothesis testing also demonstrate a significant difference between the conditions before and after the use of prompt-based AI media.

These findings emphasize that prompt-based AI not only functions as a tool for completing tasks but can also be utilized as a learning medium that enhances students' cognitive functions, particularly memory ability. Therefore, the purposeful integration of AI in learning has the potential to create a more effective, independent, and meaningful learning process for students.

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It is hoped that this research report will provide benefits and serve as a meaningful contribution to the advancement of knowledge. The author fully realizes that this work is still far from perfect; therefore, constructive criticism and suggestions are highly appreciated for future improvement.

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