



The Impact of Elementary Students' Attitudes Toward Online Learning on Memory Retention and Comprehension During the COVID-19 Pandemic: An Exploratory Study in Yogyakarta, Indonesia

Erni Munastiwi^a, Siti Marpuah^b

^aEarly Childhood Islamic Education Study Program, Universitas Islam Negeri Sunan Kalijaga Yogyakarta, Indonesia; ^bPengajian Islam, Universitas Tun Hussein Onn Malaysia, Malaysia

Abstract

Purpose – This study aims to investigate elementary school students' attitudes toward online learning during the COVID-19 pandemic, focusing on the relationship between their attitudes and cognitive outcomes such as memory retention and comprehension. The goal is to enhance understanding of how psychological factors influence the effectiveness of online education and contribute to strategies for improving educational practices in remote environments.

Methods/Design/Approach – An exploratory research design was employed, using a structured survey distributed to 906 students from eight elementary schools in Yogyakarta, Indonesia. Data were collected through online questionnaires assessing attitudes toward online learning, memory retention, and comprehension abilities. Descriptive statistics and Pearson's correlation coefficient were used to analyze the data, identifying relationships between students' attitudes and cognitive outcomes.

Findings – The study found that 52.65% of students had a negative attitude towards online learning. Students with positive attitudes exhibited better memory retention and comprehension, while those with negative attitudes showed significant challenges in these areas. The relationship between attitude and memory retention was statistically significant ($\chi^2 = 71.619$, $p < 0.001$), as was the relationship between attitude and comprehension ($\chi^2 = 143.686$, $p < 0.001$).

Originality/Value – This research adds to the limited studies on the psychological impact of online learning on younger students, offering insights into how attitudes shape cognitive performance in remote education environments. It emphasizes the importance of fostering positive attitudes to improve educational outcomes in online settings.

Research implications – The findings suggest that educational interventions should address students' attitudes to enhance cognitive engagement in online learning. The study underscores the need for blended learning models and more interactive online experiences to better support young learners.

Keywords Online learning, elementary education, attitudes, memory retention, comprehension.

Paper type Research paper

Article History

Received 19 January 2024
Revised 16 February 2024
29 March 2024
Accepted 21 April 2024



1. Introduction

The outbreak of the COVID-19 pandemic has profoundly disrupted the traditional education system, necessitating an abrupt transition from face-to-face learning to online platforms (Levrini et al., 2021). This unexpected shift has caused significant upheaval for educators, students, and parents, many of whom were unprepared for the rapid and extensive changes in teaching and learning practices (d'Orville, 2020; Fontenelle-Tereshchuk, 2021). As the pandemic persists, so too does the disruption in education, leading governments worldwide to introduce various flexible educational policies to ensure the continuity of learning activities (Aletheiani, 2021).

In Indonesia, the shift to online learning has introduced both opportunities and challenges. On one hand, online education has the potential to increase accessibility, allowing students to learn from anywhere and at any time using mobile devices such as smartphones or tablets (Curum & Khedo, 2021). On the other hand, this sudden shift has highlighted significant disparities in educational quality and access, particularly among students from different socio-economic backgrounds (Devkota, 2021). Those with better access to technology and resources tend to benefit more from online learning, while others face barriers that limit their engagement and performance in these new learning environments.

Despite the potential benefits of online learning, many studies have pointed to its limitations, particularly for younger students such as those in elementary schools. These students often lack the independence required for successful online learning and are more reliant on teacher guidance, which is diminished in remote settings (Curum & Khedo, 2021). Moreover, there are concerns about the long-term impact of online learning on students' cognitive development, with some studies reporting lower learning outcomes and decreased motivation in virtual settings (Foo et al., 2021).

One area that has received less attention in the current literature is the psychological impact of online learning on students, particularly their attitudes towards this new mode of education. While online learning has enabled the continuation of education during the pandemic, not all students have adapted equally well. Elementary school students, in particular, may experience decreased motivation and engagement, which can negatively impact their learning performance, memory retention, and understanding (Arribathi et al., 2021). These factors are crucial for understanding the overall effectiveness of online learning and the development of more supportive educational strategies.

This study aims to explore elementary school students' attitudes toward online learning, their memory retention, and comprehension abilities. It will also examine the relationship between students' attitudes and their cognitive abilities in the context of online learning. By addressing these areas, the research seeks to provide insights into the factors influencing learning performance in a remote environment and contribute to the ongoing discussion about improving educational practices during and beyond the pandemic.

2. Methods

2.1 Research Design

This study employed an exploratory research design with a survey method to collect data. The use of this design was intended to capture students' perceptions of online learning, focusing on their experiences during the digital education transition.

2.2 Sample and Participants

The research was conducted in the Yogyakarta province, involving a convenience sample of eight schools—four public elementary schools and four Madrasah Ibtidaiyah (Islamic elementary schools). A total of 906 students, ranging from grades one through six, participated in the study. This sample size was selected to represent a broad range of student experiences within the region.

2.3 Data Collection

Data were gathered via online interviews using a structured digital questionnaire created in Google Forms. The questionnaire included three key questions designed to assess students' attitudes and comprehension of online learning. The questions were: 1) "Are you happy with the online learning model?"; 2) "Can you remember the subject matter presented online?"; and 3) "Do you understand the subject matter presented online?" Responses for the first question were binary (Yes/No), while the second and third questions offered four multiple-choice options.

2.4 Data Processing and Analysis

Descriptive statistical methods were employed to process the data, focusing on frequency distributions. To explore relationships between variables, cross-tabulation was used, supplemented by statistical tests. The association between students' ability to remember and understand online lessons was analyzed using Pearson's correlation coefficient. All analyses were conducted with SPSS version 25, with a significance threshold set at a 95% confidence interval.

2.5 Ethical Consideration

This research adhered to ethical standards for human subject research. Although formal institutional review board approval was not required, all participants provided informed consent, and their responses were anonymized to protect their identities.

3. Results

3.1 Attitude, Memory Retention, and Understanding

The analysis reveals that 47.35% of respondents reported positive attitudes towards the online learning model, while 52.65% expressed a negative preference. Regarding memory retention, the distribution shows that a significant portion of students (77.8%) occasionally forgets the lessons. Only 10.2% indicated a strong ability to remember the material, while 10.8% and 1.2% frequently forgot or did not remember the lessons, respectively. In terms of comprehension, 52.32% of students found the lessons easy to understand, with 3.6% finding them very easy. However, 40.73% of students encountered difficulty, and 3.31% experienced significant challenges in understanding the content delivered through online learning.

3.2 Relationship Between Attitude and Memory Retention

A statistically significant difference was found in students' memory retention based on their attitudes towards online learning ($\chi^2 = 71.619$, $p < 0.001$). The detailed results are shown in Table 1. Students with a positive attitude towards online learning were more likely to remember the lessons well, whereas those with a negative attitude were more inclined to forget or not remember the lessons at all.

Table 1. Cross tabulation of students' attitudes toward online learning model and students' ability to remember lessons

			Attitude		Total
			Happy	Not happy	
Ability to Remember	Remember well	Amount	67 _a	25 _b	92
		% in Attitude	15.6%	5.2%	10.2%
	Sometimes I forget	Amount	346 _a	359 _a	705
		% in Attitude	80.7%	75.3%	77.8%
	Often forget	Amount	15 _a	83 _b	98
		% in Attitude	3.5%	17.4%	10.8%
	Do not remember	Amount	1 _a	10 _b	11
		% in Attitude	0.2%	2.1%	1.2%
Total	Count	429	477	906	
	% in Attitude	100.0%	100.0%	100.0%	

3.3 Relationship Between Attitude and Comprehension

The relationship between attitude and the ability to comprehend lessons was also significant ($\chi^2 = 143.686$, $p < 0.001$), as presented in Table 2. Students with a positive disposition towards online learning demonstrated better comprehension of the material compared to those with a negative attitude, who faced more difficulty in understanding. The correlation analysis indicates a weak yet significant relationship between memory retention and comprehension ($r = 0.378$, $p < 0.05$), suggesting that students' attitudes toward online learning substantially impact their cognitive engagement and outcomes.

Table 2. Cross tabulation of students' attitudes toward online learning model and students' ability to remember lessons

			Attitude		Total
			Happy	Not happy	
Ability to Remember	Remember well	Amount	67 _a	25 _b	92
		% in Attitude	15.6%	5.2%	10.2%
	Sometimes I forget	Amount	346 _a	359 _a	705
		% in Attitude	80.7%	75.3%	77.8%
	Often forget	Amount	15 _a	83 _b	98
		% in Attitude	3.5%	17.4%	10.8%
	Do not remember	Amount	1 _a	10 _b	11
		% in Attitude	0.2%	2.1%	1.2%
Total	Count	429	477	906	
	% in Attitude	100.0%	100.0%	100.0%	

4. Discussion

This study investigated the attitudes of elementary school students toward online learning during the COVID-19 pandemic, with a focus on how these attitudes relate to memory retention and comprehension. The findings indicate that students who reported a more favorable attitude toward online learning exhibited better memory retention and comprehension abilities. These findings underscore the importance of students' attitudes in determining the effectiveness of online education.

A significant portion of students in this study expressed a negative attitude towards the online learning model, which corroborates previous research showing that elementary school students face challenges in adapting to online environments (Baticulon et al., 2021). This negative attitude appears to be related to decreased memory retention and comprehension, as students with unfavorable attitudes were more likely to forget lesson content and struggle with understanding the material presented online. The significant relationships between attitude and cognitive outcomes are consistent with earlier studies that highlight the role of motivation and interest in educational outcomes (Song & Bonk, 2016).

These results align with existing literature that suggests online learning, while offering flexibility, may not provide the necessary interactive elements and teacher guidance that younger students require (Foo et al., 2021). Furthermore, the reliance on parental involvement for elementary students may compound these challenges, as not all parents can offer the support needed for successful online learning (Fontenelle-Tereshchuk, 2021). Studies of older student populations have also found that dissatisfaction with online learning can stem from feelings of isolation and reduced engagement, further contributing to lower academic performance (Watermeyer et al., 2021).

The findings of this study contribute to the growing body of research on the psychological aspects of online learning by illustrating how elementary students' attitudes affect their cognitive engagement. The link between negative attitudes and lower memory retention and comprehension can be understood through motivational theories, which posit that students who are more interested and motivated are more likely to engage with learning material, resulting in better cognitive outcomes (Prameswari et al., 2020). This reinforces the importance of fostering positive attitudes toward learning in order to enhance educational performance, particularly in online settings.

In terms of practical application, this study suggests that educational institutions and policymakers need to place greater emphasis on students' psychological readiness for online learning. Teachers can play a crucial role by designing more engaging and interactive online learning experiences that cater to younger students' developmental needs. Additionally, blended learning models, which combine online and face-to-face instruction, may offer a more effective solution by retaining the benefits of online flexibility while ensuring that students receive the direct teacher guidance necessary for their cognitive development (Baticulon et al., 2021).

This study has several limitations. First, the data were collected via self-reported questionnaires, which may introduce response biases. Second, the study focused on a single region in Indonesia, which may limit the generalizability of the findings to other populations with different socio-economic contexts or access to technology. Lastly, the cross-sectional design of the study prevents any conclusions about the causal relationship between attitudes and cognitive outcomes. Future research should consider longitudinal studies to better understand how students' attitudes evolve over time and their long-term effects on learning performance.

Given the limitations identified, future research should focus on exploring how different instructional strategies within online learning environments can foster more positive

student attitudes. Furthermore, comparative studies across different educational levels and regions could provide more nuanced insights into the effectiveness of online learning in diverse contexts. Finally, experimental designs that manipulate student engagement and instructional methods could provide causal evidence on the best practices for enhancing cognitive outcomes in online settings.

In conclusion, this study demonstrates that elementary students' attitudes toward online learning significantly influence their ability to retain and comprehend information. As online learning continues to be a major mode of education during and potentially after the pandemic, it is crucial to address students' psychological and motivational needs. By fostering more positive attitudes and providing engaging and supportive learning environments, educators can improve students' overall learning performance in online settings. These findings contribute to the growing discussion on the need for adaptive and flexible educational practices that support cognitive development in remote learning environments.

5. Conclusion

In conclusion, this study highlights the critical role that elementary students' attitudes toward online learning play in shaping their memory retention and comprehension abilities. It confirms that students with positive attitudes are more likely to engage cognitively and perform better, whereas those with negative attitudes face greater challenges in retaining and understanding lesson content. These findings underscore the importance of addressing the psychological and motivational needs of young learners in online education.

The practical implications are clear: educators and policymakers must prioritize the creation of more engaging, interactive, and supportive online learning environments to foster positive attitudes and enhance cognitive outcomes. Blended learning models may offer a promising solution by integrating online flexibility with the direct teacher interaction essential for younger students. However, the study's limitations, including its reliance on self-reported data and its focus on a single region, suggest that further research is needed to generalize these findings across different contexts.

Future studies should explore longitudinal designs to assess the evolving impact of attitudes on learning outcomes and investigate instructional strategies that can foster positive engagement in online settings. By addressing these gaps, the educational community can better support students' cognitive development in the increasingly digital landscape of education.

Acknowledgements

The authors would like to thank the anonymous reviewers for their constructive feedback.

Declarations

Author contribution statement

Erni Munastiwi: Conceptualization, Methodology, Investigation, Writing - Original Draft, Writing - Review & Editing, Project Administration. **Siti Marpuah:** Formal Analysis, Resources, Data Curation, Writing - Review & Editing, Visualization.

Funding statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declaration of interest statement

No potential conflict of interest was reported by the authors.

Additional information

Correspondence and requests for materials should be addressed to the **Corresponding Author**, Emi Munastiwi, at ✉ emi.munastiwi@uin-suka.ac.id

ORCID

Emi Munastiwi  <https://orcid.org/0000-0002-5448-2442>

Siti Marpuah  <https://orcid.org/0000-0001-5197-8453>

References

- Aletheiani, D. R. (2021). Curricular responsiveness to the Covid-19 crisis: The case of Indonesia. *PROSPECTS*.
- Arribathi, A. H., Suwanto, Rosyad, A. M., Budiarto, M., Supriyanti, D., & Mulyati. (2021). An Analysis of Student Learning Anxiety During the COVID-19 Pandemic: A Study in Higher Education. *The Journal of Continuing Higher Education*, 1–14.
- Baticulon, R. E., Sy, J. J., Alberto, N. R. I., Baron, M. B. C., Mabulay, R. E. C., Rizada, L. G. T., Tiu, C. J. S., Clarion, C. A., & Reyes, J. C. B. (2021). Barriers to Online Learning in the Time of COVID-19: A National Survey of Medical Students in the Philippines. *Medical Science Educator*.
- Curum, B., & Khedo, K. K. (2021). Cognitive load management in mobile learning systems: Principles and theories. *Journal of Computers in Education*, 8(1), 109–136.
- d'Orville, H. (2020). COVID-19 causes unprecedented educational disruption: Is there a road towards a new normal? *PROSPECTS*, 49(1–2), 11–15.
- Devkota, K. R. (2021). Inequalities reinforced through online and distance education in the age of COVID-19: The case of higher education in Nepal. *International Review of Education*.
- Fontenelle-Tereshchuk, D. (2021). Mental Health and the COVID-19 Crisis: The Hopes and Concerns for Children as Schools Re-open. *Interchange*, 52(1), 1–16.
- Foo, C., Cheung, B., & Chu, K. (2021). A comparative study regarding distance learning and the conventional face-to-face approach conducted problem-based learning tutorial during the COVID-19 pandemic. *BMC Medical Education*, 21(1), 141.
- Levrini, O., Fantini, P., Barelli, E., Branchetti, L., Satanassi, S., & Tasquier, G. (2021). The Present Shock and Time Re-appropriation in the Pandemic Era. *Science & Education*, 30(1), 1–31.
- Prameswari, N. S., Saud, M., Amboro, J. L., & Wahyuningsih, N. (2020). The motivation of learning art & culture among students in Indonesia. *Cogent Education*, 7(1), 1809770.
- Song, D., & Bonk, C. J. (2016). Motivational factors in self-directed informal learning from online learning resources. *Cogent Education*, 3(1), 1205838.
- Watermeyer, R., Crick, T., Knight, C., & Goodall, J. (2021). COVID-19 and digital disruption in UK universities: Afflictions and affordances of emergency online migration. *Higher Education*, 81(3), 623–641.