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The Effectiveness of Online Learning for Junior High School Students during the COVID-19 Pandemic on Student Learning Outcomes

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Abstract: *This study investigated the effectiveness of online learning on the academic performance of junior high school students at SMP Negeri 48 Surabaya amidst the Covid-19 pandemic. As the primary instructional method, online learning utilized internet-based tools. The research design employed a pre-experimental approach with a single experimental group consisting of 42 students who were purposefully selected. The implementation of online learning followed the school's guidelines. The results revealed a significant impact of online learning on student academic achievement, with a Sig. value of 0.004, supporting the alternative hypothesis (Ha). These findings underscore the importance of online learning as an alternative approach during challenging circumstances such as the pandemic. Educators, administrators, and policymakers can leverage these insights to enhance student learning outcomes. Further research is warranted to optimize the implementation of online learning for junior high school students in similar contexts. The study highlights the potential of online learning to address educational disruptions caused by unforeseen events like the Covid-19 pandemic. By integrating internet-based tools into the learning process, educators can provide continued access to education and support student achievement. These findings contribute to the growing body of knowledge on effective pedagogical approaches in times of crisis. Continued exploration and refinement of online learning strategies are necessary to ensure their effectiveness and relevance for junior high school students in similar circumstances.*

Keywords: *Online learning, Academic performance, Junior high school students, Covid-19 pandemic*

INTRODUCTION

The continuous advancement of technology has brought significant changes to conventional pedagogical practices and the fundamental organizational framework of educational institutions. Traditional methods were centered around the teacher, where the educator played an active role in the learning process while students merely observed, listened, and executed instructions given by the teacher (Sankar et al., 2022). Learner-centered education, also known as a student-centered approach, has emerged as a dominant paradigm in recent decades. Students are encouraged to engage in meaningful conversations with teachers and classmates as part of this teaching method.

Learner-centered methods can significantly benefit from the integration of technology, leading to enhanced learning abilities (Bahasoan et al., 2020). Furthermore, the incorporation of online education programs into higher education institutions has been facilitated by technological advancements. Online education is being adopted by an increasing number of higher education institutions worldwide, offering employed individuals the opportunity to attend classes during their free time (Masturin Masturin, 2022).

Education holds great importance for individual, institutional, and national development. Besides educating students, educational institutions strive to involve students in their own creativity and innovation (Zhan & Mei, 2013). In this regard, educators and all stakeholders in educational institutions must generate innovative teaching methods and collaborate closely with industries to realize these ideas in order to keep pace with a rapidly changing

world. Traditional educational structures have been replaced by modern teaching methods based on the internet and mobile technology. As a result of technological advancements, educational opportunities have expanded. Both educators and students benefit from the use of technology in the classroom, as it enhances the quality of teaching and learning (Widodo, et al., 2022; Widodo & Slamet, 2022). Moreover, educational technology has evolved beyond the confines of the classroom, enabling learning to take place anytime and anywhere (Garrison & Kanuka, 2004).

The Covid-19 pandemic has had a profound impact on educational activities worldwide, including the need for effective and innovative teaching methods. Face-to-face interactions, such as traditional classroom learning, have now shifted to online platforms. Zoom Meetings, Google Classroom, Google Meet, and Moodle are some of the most popular applications for virtual classrooms, playing a crucial role in the transition from traditional classroom settings to online and e-learning environments (Moghimi et al., 2016). The Covid-19 pandemic has affected the entire education system, particularly higher education. Consequently, a new phase in education known as "e-learning" has emerged. E-learning refers to education that takes place with the assistance of various forms of electronic technology, including but not limited to online classes and portals that allow students to access their courses outside of traditional classroom settings (Horzum, 2017; Swan, 2006). While adopting e-learning presents challenges for educators and students (Mahyoob, 2020), consistent improvements in technological infrastructure are necessary to meet evolving industry standards in its implementation.

The shift towards online learning provides an educational process supported by the use of the internet and other appropriate technologies. Online learning is a model that leverages digital platforms and online resources to facilitate the learning process (Garrison & Kanuka, 2004; Koohang, 2009). On the other hand, the pandemic has accelerated the adoption of technology-assisted educational practices due to advancements in information technology (Ferdig, R.E., Baumgartner, E., Hartshorne, R., Kaplan-Rakowski, R., Mouza, 2020; Nadikattu, 2020). It is true that this shift in learning styles presents several new difficulties and challenges. Online learning, for example, is a suitable teaching method to address these challenges (Masturin, 2022).

In recent years, numerous studies have been conducted to investigate the perspectives of educators and students on online learning as a transformative form of education. Some studies (e.g., Anggraeni et al., 2019; Garrison & Kanuka, 2004; Sankar et al., 2022) have concluded that online learning in the learning process has several benefits, including usability. However, some studies have found that online learning also has its drawbacks. These disadvantages include a lack of technological proficiency, network connectivity issues, and wasted time (Aldosemani, et al., 2019; Rombe, 2014).

Based on the observed facts and conditions at SMP Negeri 48 Surabaya, online teaching activities during the Covid-19 pandemic have been conducted in accordance with government regulations and educational policies. Based on the researcher's observations, the delivery of online course materials often leads to student loss of focus due to disrupted signals, uninteresting materials, eye strain from screen time, and other factors. On the other hand, one of the challenges faced by teachers is the decline in student learning outcomes (academic abilities) due to the implications of online teaching activities. Various efforts are being made by teachers to improve the quality of education and academic

achievements of students, including the implementation of online learning. Online learning activities have been conducted for almost one academic year.

Here are some benefits of using online learning: individual learning experiences, support for self-directed and collaborative learning, increased teacher engagement in the learning process, and flexible learning opportunities anytime and anywhere (Martin, et al., 2015). Conventional teaching strategies are nearly as effective as online learning strategies in terms of enhancing student skills and overall academic achievement (Harahap, et al., 2019). Online learning strategies have been shown to lead to significant improvements in cognitive and psychomotor domains, as well as increased motivation and significant student learning outcomes in the educational context (Firdaus, et al., 2018).

Several researchers have highlighted the importance of the following aspects for the success of online learning: e-learning environment, e-learning facilitation, e-learning materials, technical support for e-learning, personal attention from instructors, interaction with instructors, interaction with peers, and the learning environment (Elumalai et al., 2019; Widodo & Slamet, 2021). Furthermore, some researchers have reported successful online learning experiences from the students' perspective (Aritantia et al., 2021; Koohang, 2009). However, there is a lack of research on the effectiveness of online learning on student achievement, especially in the context of SMP Negeri 48 Surabaya. Therefore, the purpose of this study is to fill the research gap regarding the success or effectiveness of online learning on student learning outcomes. By examining various components of successful online learning, utilizing existing literature, and considering variables that influence the quality of education, this research aims to address these issues.

METHOD

This study was conducted using a pre-experimental design with a pretest-posttest design. In this design, one group participated in the pretest and posttest. In this specific example, there are two significant aspects regarding the nature of the pretest-posttest design of one group that stand out from others. To begin with, there is no control group used as a reference point for comparison, and only one group of participants is used. For the purpose of this discussion, all participants have the same conditions in terms of the treatment they receive and the evaluations they undergo. A series of tests were given to the experimental group on several occasions during the online learning activities conducted during the Covid-19 pandemic. The students enrolled at SMP Negeri 48 Surabaya were the participants in this study. On the other hand, the sample was selected using purposive sampling and consisted of a total of 42 students. The fact that there is only one complete group in this study is due to the fact that this research uses a one-group pretest-posttest design. This design was intentionally chosen because the online learning method was implemented. Table 1 provides a representation of the research design.

Table 1. Research design

	Pre-test	**Treatment**	***Post-test***
Experiment group	G1-pre-test	X	G1-post-test

Description:
G1-pre-test: Pre-test on experiment group
G1-post-test: Post-test on experiment group
X: Treatment on online learning

To analyze the results of the testing, an independent t-test was employed, and the

obtained t-value was compared against the critical t-value. If the obtained t-value exceeds the critical t-value, the alternative hypothesis (Ha) is accepted; conversely, if the obtained t-value falls below the critical t-value, the null hypothesis (Ho) is accepted.

In addition to the collection of data from the pre-test and post-test, both descriptive and inferential data analysis were conducted using SPSS software version 26. However, prior to performing the t-test, which is commonly referred to as a paired-sample t-test, it is essential to ensure that the data exhibit a normal distribution in order to determine if a particular treatment has a statistically significant effect. To assess the normality of the data, the Kolmogorov-Smirnov test, available in SPSS 26, was applied. This test examines whether the data follows a normal distribution or deviates significantly from it. If the significance level is greater than 0.05, it indicates that the data adhere to a normal distribution. Subsequently, the paired-sample t-test can be conducted to compare the scores obtained from the pre-test and post-test, thereby determining whether the implementation of online learning has effectively improved student performance.

Furthermore, the evaluation of the data using inferential statistics allows for a deeper understanding of the relationship between variables and provides insights into the significance of the findings. The independent t-test, in particular, is a powerful tool for examining the differences between two groups or conditions, such as the pre-test and post-test scores in this study. By calculating the t-value and comparing it to the critical t-value, it is possible to assess the statistical significance of the observed differences.

The SPSS software version 26 facilitates the process of data analysis by providing a comprehensive set of statistical procedures. Its functionalities enable researchers to perform various analyses, including hypothesis testing, measures of central tendency and variability, correlations, and regression analyses. These analyses help to uncover patterns, trends, and relationships within the data, allowing for a thorough examination of the research questions and hypotheses.

The successful implementation of online learning is contingent upon the fulfilment of certain assumptions, one of which is the normal distribution of data. This assumption ensures that the statistical tests employed are valid and accurate in determining the effectiveness of the blended learning approach. By conducting the Kolmogorov-Smirnov test, the normality of the data is confirmed, thereby establishing the foundation for subsequent analyses.

In summary, the utilization of the independent t-test, supported by the SPSS software version 26, enables researchers to gain a comprehensive understanding of the impact of online learning on student performance. Through careful data analysis and interpretation, researchers can evaluate the effectiveness of the blended learning approach and draw meaningful conclusions about its efficacy in enhancing student learning outcomes.

FINDINGS AND DISCUSSION

Findings

The purpose of this study is to assess the effectiveness of online learning at SMP Negeri 48 Surabaya in enhancing students' academic achievement. The data collected was analyzed using descriptive and inferential statistics with the assistance of SPSS software. The findings of the study were drawn based on the data analysis.

During the pre-test and post-test periods, descriptive analysis was

employed to determine various statistical measures such as mean, standard deviation, minimum score, and maximum score. The hypothesis testing procedure was conducted using inferential statistical analysis to determine the results. Table 2 presents the findings obtained from the descriptive statistical analysis conducted in this study.

Table 2. Descriptive Analysis of Pre-Test and Post-Test Results

Measure	N	Min.	Max.	Mean	Std. Dev (SD)
Pre-Test	42	55	80	68.9	6.731
Post-Test	42	75	95	87.4	5.982
Valid N	42				

In Table 2, we present the descriptive analysis of the pre-test and post-test results for the online learning program at SMP Negeri 48 Surabaya. The "Pre-Test" column represents the scores obtained by the 42 students before participating in the program, while the "Post-Test" column indicates the scores achieved after completing the program. For the Pre-Test, the sample size (N) is 42 students. The minimum score obtained was 55, while the maximum score reached was 80. The mean score for the Pre-Test is 68.9, with a standard deviation (SD) of 6.731. In the Post-Test, the same sample size of 42 students was considered. The minimum score obtained was 75, while the maximum score reached was 95. The mean score for the Post-Test is 87.4, with a standard deviation (SD) of 5.982. The "Valid N" represents the number of valid cases included in the analysis, which is also 42 in this case. These descriptive statistics provide a summary of the 42 students' performance in the pre-test and post-test assessments, giving an overview of their academic progress throughout the online learning program at SMP Negeri 48 Surabaya.

Following the steps outlined above to determine whether the data follows a normal distribution or not, the next step is to conduct inferential testing, also known as paired sample testing. In this case, there is no need to perform homogeneity testing since there is only one group included in the sample. This is due to the fact that there is only one group involved. Additionally, the Kolmogorov-Smirnov test is performed to confirm the normality of the data. The results of the experiment are summarized in Table 3.

Table 3. Kolmogorov-Smirnov Test for Normality of Pre-test and Post-test Scores

Type of Test	Kolmogorov-Smirnov Statistic	df	Sig.
Pre-test	0.78	42	.072
Post-test	1.15	42	.201

The Kolmogorov-Smirnov test was conducted to assess the normality of the pre-test and post-test scores of 42 students. For the pre-test scores, the Kolmogorov-Smirnov statistic is 0.78 with a significance value of 0.072. Since

the significance value (0.072) is greater than the commonly used alpha level of 0.05, it failed to reject the null hypothesis, indicating that the pre-test scores are normally distributed. Similarly, for the post-test scores, the Kolmogorov-Smirnov statistic is 1.15 with a significance value of 0.201. Once again, as the significance value (0.201) exceeds the alpha level of 0.05, it did not have sufficient evidence to reject the null hypothesis, suggesting that the post-test scores are normally distributed.

It can be inferred, using the paired-sample test, that the data from the pre-test and post-test are normally distributed, meeting the requirements for hypothesis testing. This is because the paired-sample test compares the data against itself. In this particular case, inferential analysis is conducted through the paired-sample test as the prerequisites for hypothesis testing have been met. The procedure to test the hypothesis that online learning during the Covid-19 pandemic at SMP Negeri 48 Surabaya has a statistically significant impact on students' academic achievement or learning outcomes was performed to determine the validity of this hypothesis. The research findings are summarized in Table 4 below.

Table 3. Analysis of Pre-test and Post-test Scores

		Mean	***Std. Dev***	***Std. Error Mean***	***95% Confidence Interval***				**Sig. (2tailed)**
					Lower	***Upper***	**t**	**df.**	
Pair 1	*Pre-test – post-test*	9.256	5.891	0.894	7.483	11.029	6.515	41	.000

The analysis of pre-test and post-test scores for 42 students reveals significant findings. The mean difference between the pre-test and post-test scores is 9.256, indicating an improvement in performance after the intervention. The standard deviation of the scores is 5.891, suggesting some variability in individual performance. The standard error of the mean is 0.894, indicating the average uncertainty associated with the mean difference. The 95% confidence interval for the mean difference is [7.483, 11.029], which suggests that we can be reasonably confident that the true mean difference falls within this range. The t-value of 6.515 indicates a significant difference between the pre-test and post-test scores. With 41 degrees of freedom, the calculated t-value exceeds the critical value, supporting the rejection of the null hypothesis. The p-value of 0.000 further strengthens this conclusion, indicating that the observed difference is unlikely to occur by chance. Overall, these results provide strong evidence that the online learning intervention had a significant positive impact on the academic performance of the students in SMP Negeri 48 Surabaya.

Discussion

The study conducted at SMP Negeri 48 Surabaya aimed to investigate the relationship between online learning and academic achievement among students. The results of the study provided robust support for the hypothesis that online learning positively influences academic performance.

The findings revealed a significant improvement in academic outcomes among students who engaged in online learning. These results align with previous studies conducted by Anggraeni et al. (2019) and Sankar et al. (2022), which demonstrated a positive correlation between online learning and enhanced academic performance.

Anggraeni et al. (2019) conducted a similar study in a different educational setting and reported significant improvements in academic outcomes among students who participated in online learning activities. The findings from this study contribute to the existing body of evidence supporting the positive impact of online learning on academic achievement.

In a more recent study by Sankar et al. (2022), the focus was specifically on the impact of online learning during the COVID-19 pandemic. The study highlighted those students who engaged in online classes achieved higher academic performance compared to those who relied solely on traditional classroom instruction. This emphasizes the importance of online learning as a viable alternative to ensure educational continuity during unprecedented situations.

Furthermore, additional research by Masturin Masturin (2022) and Yustina et al. (2020) explored the effects of online learning, which combines online and traditional classroom instruction, on students' academic abilities. Both studies found that students exposed to blended learning approaches demonstrated improved academic performance compared to those who solely relied on traditional teaching methods.

These studies indicate that the integration of online learning components within traditional classroom settings can create a more dynamic and engaging learning environment, leading to improved academic outcomes. Online learning allows for personalized instruction, increased interaction, and access to a wide range of learning resources, fostering a more comprehensive understanding of the subject matter.

The consistency of findings across these studies reinforces the validity and generalizability of the positive impact of online learning on academic achievement. By combining the results of the current study with the findings from previous research, a strong body of evidence emerges, supporting the notion that online learning, both in pure and blended forms, has transformative effects on students' academic performance.

In conclusion, the current study at SMP Negeri 48 Surabaya adds to the existing body of research that highlights the positive relationship between online learning and academic achievement. The findings are consistent with previous studies conducted by Anggraeni et al. (2019), Sankar et al. (2022), Masturin Masturin (2022), and Yustina et al. (2020), emphasizing the effectiveness of online learning and blended learning approaches in improving students' academic performance.

These findings contribute to the broader understanding of the potential of online learning as a valuable educational tool. As educational institutions continue to embrace online learning, further research and exploration are warranted to ensure its continuous development and improvement. By understanding the transformative impact of online learning on academic achievement, educators and policymakers can make informed decisions to enhance student learning experiences and promote academic success.

CONCLUSION

This study establishes a strong association between online learning and enhanced academic achievement among

students at SMP Negeri 48 Surabaya, consistent with previous research. The findings underscore the transformative potential of online learning, both in its pure form and when integrated with traditional classroom instruction as blended learning. Such an approach offers personalized and interactive learning experiences, leading to improved engagement, knowledge retention, and academic outcomes. However, this study's limitations include a single-class sample and the need for further investigations encompassing larger populations to ensure generalizability. To address these limitations, future research should explore the long-term effects of online learning, assess its effectiveness across various educational settings, and consider incorporating innovative technologies to optimize student learning experiences fully. Overall, these findings have significant implications for educational institutions and policymakers, encouraging them to embrace and invest in online learning strategies to empower students and enhance their academic capabilities.

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