

Analysis of the Effectiveness of Online Learning Based on Google Classroom on High School Students' Learning Achievement

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ABSTRACT

Purpose of the study: This study employs a qualitative descriptive approach using a systematic literature review. Data were collected from scientific journal articles published between 2020 and 2022. The analysis follows the framework of data reduction, data display, and conclusion drawing to synthesize findings on the impact of Google Classroom on students' learning outcomes.

Methodology: This study employs a qualitative descriptive approach using a systematic literature review. Data were collected from scientific journal articles published between 2020 and 2022. The analysis follows the framework of data reduction, data display, and conclusion drawing to synthesize findings on the impact of Google Classroom on students' learning outcomes.

Main Findings: The findings indicate that Google Classroom significantly enhances students' academic performance, motivation, and engagement. The platform provides flexibility in accessing learning materials, facilitates student-teacher interactions, and supports independent learning. Additionally, Google Classroom fosters active participation, improves discipline in assignment submission, and enhances digital literacy among students.

Novelty/Originality of this study: This study contributes to the existing body of knowledge by providing a comprehensive review of Google Classroom's effectiveness in online learning. It highlights the platform's role in fostering student engagement and improving learning outcomes while addressing the challenges of digital education. The findings serve as a valuable reference for educators and policymakers in optimizing online learning strategies.

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1. INTRODUCTION

Education is a fundamental aspect of improving human resource quality and supporting sustainable development. In the education system, teachers play a crucial role in designing and implementing learning processes that align with the applicable curriculum standards, such as the 2013 Curriculum. The success of learning is not solely dependent on the delivery of material by teachers but also on the active involvement of students in the learning process. Students should not only passively receive information but also actively participate in discussions and knowledge exploration. Therefore, effective interaction between students and teachers fosters a more meaningful learning experience.

A learning process that involves active interaction helps students gain a deeper understanding of concepts. Effective comprehension can be achieved through various methods, such as group discussions, collaborative assignments, and hands-on learning activities. Teachers must implement appropriate strategies to ensure an optimal learning process that engages students. Meaningful learning not only enhances students'

understanding but also encourages them to think critically and creatively. Consequently, active participation in learning is a crucial factor in improving the quality of education [1], [2].

Educators are expected to select, adapt, and implement learning strategies that align with students' conditions and the school environment. Choosing the right strategy helps create a more conducive learning atmosphere and increases students' interest in learning. Effective learning is not only determined by the methods used but also by the extent to which students actively engage in the process. Teachers should consider various approaches that promote student participation to enhance learning outcomes. Thus, the quality of learning can be optimized and tailored to students' needs.

The success of learning is measured not only by students' final achievements but also by the learning process itself. Factors such as the learning environment, teacher-student interaction, and student independence play a vital role in determining learning outcomes. Student learning independence is one of the key aspects influencing their academic achievement [3]. Students with a high level of independence tend to be more active in exploring materials and gaining a deeper understanding of concepts. Therefore, teachers should encourage and facilitate independent learning to help students develop optimally.

Significant changes in education occurred due to the Covid-19 pandemic, which affected Indonesia's education system. Face-to-face classroom learning had to transition into online learning [4]. Online learning relies on internet access and the use of various e-learning platforms to support teaching and learning activities [5]. Online learning must be able to provide meaningful learning experiences for students during the Covid-19 emergency period [6]. As a result, online learning became the primary solution to ensure the continuity of the education process in Indonesia.

Online learning utilizes internet networks for delivering materials and facilitating teacher-student interaction. Several online learning platforms, such as Google Classroom, Edmodo, and Schoology, have been widely used to support digital-based learning [7]. One of the most popular and accessible platforms is Google Classroom, which offers advantages such as flexible learning schedules, easy access to materials, and enhanced digital skills for both students and teachers. Google Classroom enables more interactive learning and supports both synchronous and asynchronous learning models. This platform is also considered efficient and effective in addressing various challenges in remote learning [8].

Although various previous studies have examined the effectiveness of Google Classroom in online learning, most of them have focused more on user perceptions, technology adoption, and technical constraints in its implementation. This study introduces a novelty by conducting an empirical analysis of the impact of Google Classroom usage on student learning outcomes at the secondary school level. Unlike previous research, which has predominantly been conducted in the context of higher education, this study emphasizes how Google Classroom features can enhance students' conceptual understanding and active engagement in the online learning process at the secondary school level. Additionally, this study also considers factors influencing the effectiveness of this platform, such as students' self-regulated learning, teacher-student interaction, and the availability of technological access.

In the digital and post-pandemic era, the integration of technology in education has become an essential necessity. As one of the most widely used online learning platforms, Google Classroom needs further evaluation to ensure its effectiveness in improving the quality of education. The significance of this research lies in its effort to provide a deeper understanding of how Google Classroom-based learning can be optimized to enhance student learning outcomes. The findings of this study are expected to contribute to teachers, schools, and policymakers in developing more effective online learning strategies that are student-centered and aligned with their needs.

Based on this background, this study aims to analyze the effectiveness of online learning using Google Classroom in relation to high school students' learning achievement. Online learning has become a primary alternative in education, especially in situations that limit direct classroom interaction. Google Classroom, as one of the e-learning platforms, offers various features that support more flexible and efficient learning. The effectiveness of this platform needs to be examined in-depth to understand its contribution to students' learning achievements. Therefore, this study focuses on an empirical analysis of the implementation of Google Classroom in online learning.

This study is expected to provide insights into the advantages and challenges encountered in using Google Classroom. The benefits of this platform include accessibility, time flexibility, and ease in delivering and managing learning materials. However, its implementation may also face obstacles, such as limited internet access and technological readiness among students and teachers. Analyzing its effectiveness will help evaluate the impact of Google Classroom on students' academic achievement in online learning. Consequently, the findings of this research can serve as a reference for educators and policymakers in optimizing the use of technology in education.

2. RESEARCH METHOD

This study employs a qualitative descriptive approach, with the type of research being library research. Library research involves collecting data or scholarly works related to the research object or gathering data from various literary sources. It is a systematic study conducted to address a specific problem by critically and thoroughly analyzing relevant literature. The role of the researcher in qualitative research is as an instrument. This means that in this study, the researcher is responsible for interpreting meanings and identifying values. The researcher also acts as the planner, data collector, analyst, data interpreter, and ultimately the initiator of the research findings.

The data source in this study is secondary data. Secondary data refers to data that is not obtained through direct experience. The data used in this study consists of findings from prior research published in scientific journals between 2020 and 2022. The data collection technique used in this study is library research. Library research involves gathering existing data, understanding the conclusions of each study, and utilizing these sources as literature and references for comprehending and analyzing the research. In this study, the data is derived from articles published in national and international journals between 2020 and 2022.

The data analysis technique in this study follows the interactive model of qualitative data analysis proposed by Miles and Huberman, which consists of three main stages: data reduction, data display, and conclusion drawing.

1. **Data Reduction** At this stage, collected research articles are filtered and categorized based on their relevance to the effectiveness of Google Classroom in online learning. Articles that do not meet the inclusion criteria or contain redundant information are eliminated to maintain the focus of the study. Essential information such as research objectives, methodologies, key findings, and conclusions is extracted and summarized. This process helps organize the data so that further analysis can be conducted systematically.
2. **Data Display** The extracted data is then presented in structured formats such as tables, charts, and figures to illustrate trends and findings related to the effectiveness of Google Classroom. The information is categorized into key themes, including student engagement, academic achievement, digital literacy, and teacher-student interaction. A comparative analysis is performed to identify patterns, similarities, and variations among different studies, enabling a more comprehensive understanding of the topic.
3. **Conclusion Drawing and Verification** In this final stage, the synthesized findings are analyzed to derive key insights regarding the impact of Google Classroom on student learning. Conclusions are drawn based on a critical evaluation of the literature, highlighting the strengths, challenges, and limitations of Google Classroom in supporting online learning. To ensure the credibility of the findings, a triangulation process is applied.
 - **Source Triangulation:** Data from multiple journal articles are compared to identify consistent findings and trends.
 - **Theoretical Triangulation:** The results are interpreted using multiple educational theories, such as constructivist learning theory and digital learning frameworks.
 - **Methodological Triangulation:** Findings from both qualitative and quantitative studies are integrated to provide a holistic perspective.

To facilitate the research process, several key stages are implemented. The first stage is data collection, where relevant sources are gathered to support the analysis. Since this study employs a library research approach, the collected materials include empirical data and information from journals, official research reports, and other literature aligned with the research theme.

The next stage involves reviewing literature sources, which is not a passive activity but an intellectual exploration requiring active and critical engagement. Researchers must go beyond merely absorbing information and instead critically analyze materials to identify gaps and new ideas related to the research topic. Following this, the researcher engages in note-taking, which is a crucial phase in library research. At this stage, all reviewed materials must be systematically synthesized and summarized, forming the foundation for drawing conclusions and compiling the research report.

Subsequently, the interpretation and writing stage is conducted to uncover the underlying meaning of the collected data. The findings are then compiled into a research report following academic writing guidelines to ensure clarity and coherence. Finally, the research report compilation serves as the concluding stage, where the findings are systematically presented in a scientific format, such as a thesis or academic research report. This structured approach ensures that the research contributes valuable insights to the academic field while maintaining scientific rigor.

By implementing this structured data analysis process, this study ensures the validity and reliability of the findings, providing an in-depth understanding of the effectiveness of Google Classroom in online learning at the secondary school level.

3. RESULTS AND DISCUSSION

3.1. Research Results

This study is a literature review on the implementation of the effectiveness of online learning using Google Classroom. The data used in this study consists of scientific journals published between 2020 and 2022. Table 1 presents the list of journals analyzed in this study.

Table 1. Perception of Semester Learning Plan Preparation Indicators

No	Coding	Article Title	Effectiveness
1.	[9]	Improving Student Activities and Learning Outcomes Using <i>the Flipped Classroom</i> Model Through <i>the Google Classroom</i> Application	The effectiveness of online learning using <i>the Flipped Classroom</i> model with the help of <i>Google Classroom</i> can increase learning outcomes from 69.29 to 88.43
2.	[10]	Improving Learning Outcomes About Cells Through the Implementation of Online Learning <i>Google Classroom</i> Application in Grade XI Science 1 Students of SMA Negeri 1 Tegallalang	The effectiveness of online learning using <i>Google Classroom</i> can increase learning outcomes from 75.32 in the first cycle to 82.85 in the second cycle.
3.	[11]	The Effect of <i>Online</i> Learning Assisted by <i>Google Classroom</i> on the Learning Outcomes of High School Students on the Circulatory System Material in Humans	The use of <i>Google Classroom</i> has an effect on student learning outcomes from 50.40 in the <i>pre-test</i> to 86.85 in the <i>post-test</i> .
4.	[12]	The Effect of the Use of <i>Google Classroom</i> Application in Biology Learning on Student Learning Outcomes at SMA Negeri 2 Tondano	The effectiveness of learning using <i>Google Classroom</i> was influential in increasing learning outcomes from 51.0 to 82.4.
5.	[13]	The Effect of the Use of <i>Google Classroom</i> Application on Excretory System Materials on Student Learning Outcomes	The use of <i>Google Classroom</i> had an effect on the learning outcomes in the experimental class, which was 81.97
6.	[14]	Students' Learning Outcomes and Critical Thinking Skills by Using the Inquiry Learning Model Through <i>Google Classroom</i>	The use of <i>Google Classroom</i> can improve learning outcomes and critical thinking skills from 45.56 to 82.71
7.	[15]	The Use of <i>the Google Classroom</i> Application to Improve the Results and Activity of Biology Learning Students in Class XI Science.1 SMA Negeri 1 Kapongan during the Covid 19 Pandemic	The use of <i>Google Classroom</i> is effective in increasing learning outcomes and student activity in the first cycle, which is 78.3 to 85.5 in the second cycle
8.	[16]	Student Learning Outcomes Learned Online Using <i>Google Classroom</i>	The use of <i>Google Classroom</i> can increase learning outcomes from 53.83 in the <i>pre-test</i> to 85.52 in the <i>post-test</i>
9.	[17]	The Effect of <i>E-Learning</i> with <i>Google Classroom</i> on Student Biology Learning Outcomes and Motivation	The use of <i>Google Classroom</i> had an effect on the increase in learning outcomes and student motivation from 32.06 and increased in the <i>post-test</i> by 73.33
10.	[18]	Online Teaching to Increase Student Participation and Learning Completeness in Biology Subjects in High School with <i>the Google Classroom</i> Platform	The effectiveness of online learning using <i>Google Classroom</i> can increase student participation and learning outcomes in 2 cycles from 50.3 to 66.9

Based on the journal analysis presented in Table 1, a total of 10 journals discussing online learning using Google Classroom were examined. Among them, 1 journal was published in 2020, 7 journals in 2021, and 2 journals in 2022, all of which demonstrated the effectiveness of Google Classroom. This effectiveness is evident from the research findings, which indicate an improvement in students' learning outcomes.

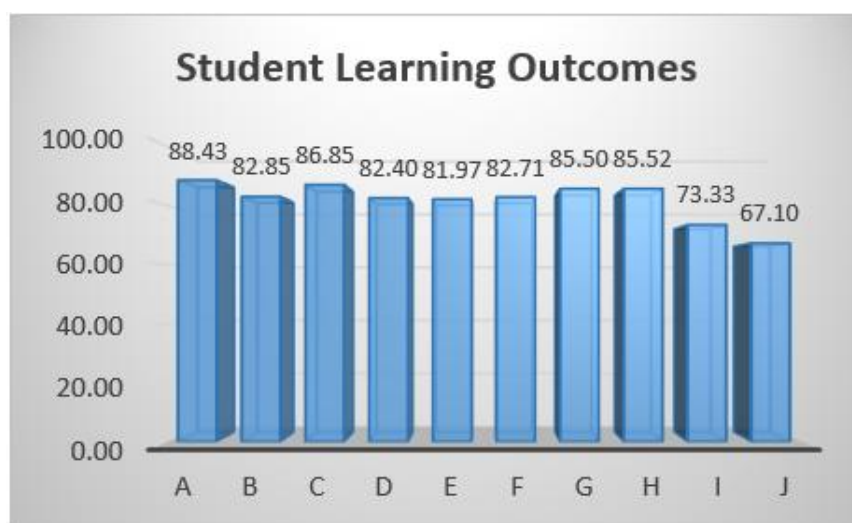


Figure 1. Student Learning Outcomes Using *Google Classroom*

Based on the graphical representation of students' learning outcomes analyzed in 10 articles, it is evident that students who used Google Classroom in online learning experienced an improvement in their learning outcomes. This indicates that Google Classroom is an effective platform for implementation in online learning.

3.2. Discussion

This study is a literature review on the effectiveness of online learning using Google Classroom on high school students' learning outcomes. Based on the analysis in Table 1, it was found that the utilization of Google Classroom in the classroom is effective in improving students' learning outcomes. The effectiveness of Google Classroom can be observed in students' learning independence, such as their ability to download materials, submit assignments, and engage in discussions anytime and anywhere. This allows students to acquire information not only from the teacher but also from their peers, fostering curiosity and creating knowledge that positively impacts learning outcomes. This finding is supported by previous research highlighted that Google Classroom offers various benefits, including increased student engagement, openness to new knowledge, enhanced independence, and creativity [19]–[22].

Google Classroom also facilitates a deeper learning experience for both teachers and students. This is because both students and teachers can submit assignments, distribute tasks, and evaluate work from home or any location without being restricted by time or class hours. Additionally, it enables students to better understand the lesson material, as they can re-access shared materials on Google Classroom at any time. Furthermore, many students are observed to be more active in asking questions during the learning process compared to previous classroom-based learning. This finding is supported by previous research state that Google Classroom is highly beneficial for online learning and contributes to improved student learning outcomes [8], [21], [22]. Moreover, as it is freely accessible and compatible with various devices, it allows students to review learning materials outside of regular class hours, further enhancing their academic progress.

The effectiveness of implementing Google Classroom in learning can be observed through interactive multi-directional communication between teachers and students. In this setting, students can freely communicate and participate with their teachers and classmates in responding to the learning materials presented. Multi-directional communication is facilitated through direct conversations using the Communication feature in Google Classroom, allowing students to provide comments and feedback on completed assignments. This interaction enhances student engagement in online learning, ultimately leading to improved learning outcomes. This finding is in line with educational communication theory, which emphasizes that effective learning requires an active communication process [23], [24].

Students' activities during lessons also indicate their interest and enthusiasm in engaging with the learning process. The implementation of Google Classroom enhances the attractiveness of material presentation, which in turn boosts motivation, interest, and students' attention, allowing them to focus more effectively on the content delivered. Consequently, the effectiveness of learning increases. Moreover, the use of Google Classroom makes the learning process more enjoyable, enabling students to express their abilities and facilitating easier retention of non-complex lessons. These findings align with the previous research stated that the use of instructional media enhances students' attention and engagement with the learning material [25]–[28].

The effectiveness of online learning with Google Classroom can also be observed from the aspect of student discipline, as students can submit assignments on time due to the Create Assignment feature. This feature helps students track submission deadlines, encouraging them to be more disciplined in completing and submitting their assignments punctually. Additionally, students can record their attendance, submit assignments, and respond promptly to any inquiries during the learning process. These findings have been supported by previous research stated that completing assignments in Google Classroom is more efficient, as students can directly submit their work within the platform without the need to write answers in a notebook or print them on paper [21], [28]–[30].

Google Classroom is effectively implemented as various learning references and materials have been uploaded to the platform, allowing students to access learning resources with ease. Additionally, students feel more engaged and comfortable due to the convenience of accessing learning materials, which positively impacts their academic performance. These findings align with previous research stated that one of the advantages of using technology in the learning process is that both students and teachers can efficiently access information [22], [31]. Furthermore, learning experiences become more enjoyable as information can be accessed either for free or through paid platforms, such as Google Classroom.

Google Classroom, as a learning platform, plays a crucial role in supporting the implementation of e-learning. The improvement in student learning outcomes is attributed to the integration of e-learning through Google Classroom in the learning process. This finding is further supported by the research of Tavangarian [32] and aligns with the perspective of Tangirov et al., [33] who stated that e-learning offers advantages, including individualized learning, allowing students to study at their own pace and according to their unique characteristics.

Based on the analysis of 10 articles, it was found that Google Classroom effectively enhances student learning outcomes. This effectiveness is attributed to its numerous advantages, including ease of use, time efficiency, cloud-based accessibility, flexibility, and cost-free availability. Additionally, Google Classroom contributes to a more effective learning experience, particularly as students can engage in virtual face-to-face interactions at any time through online classes. Moreover, students can learn, listen, read, and submit assignments remotely without requiring direct face-to-face interactions [34], [35]. Therefore, it can be concluded that Google Classroom is highly effective for implementation in online learning.

The findings of this study have significant implications for various stakeholders, including educators, policymakers, and educational technology developers. For educators, this research confirms that using Google Classroom in online learning can enhance conceptual understanding, learning motivation, and student engagement. Therefore, teachers are encouraged to optimize the available features in Google Classroom, such as discussion forums, assignments, and feedback, to enrich students' learning experiences. For policymakers, this study highlights that integrating technology into education requires infrastructure support and training for both teachers and students. Governments and educational institutions should consider providing regular training programs on the effective use of online learning platforms to maximize their potential and align them with students' needs. From the perspective of educational technology developers, these findings can be used to improve features and user experience in Google Classroom. For instance, incorporating more interactive tools and supporting project-based or collaborative learning could help make learning more engaging and student-centered.

While this study provides valuable insights into the effectiveness of Google Classroom in online learning, several limitations should be noted. First, the study relies solely on secondary sources from scholarly articles published between 2020 and 2022, making its findings dependent on the quality and scope of the available literature. Second, since this research employs a systematic literature review method, it does not include direct empirical data from students or teachers using Google Classroom in real learning environments. Consequently, the findings are more of a synthesis of previous studies rather than results derived from direct experiments or surveys. Third, this study focuses on the context of secondary education, meaning its findings may not be fully generalizable to other educational levels, such as primary or higher education. Factors such as students' digital skills, technological support, and instructional strategies may vary across education levels and should be considered in future research.

Given the limitations identified in this study, future research should aim to provide a more comprehensive understanding of the effectiveness of Google Classroom in online learning. First, empirical research involving primary data collection, such as surveys or experimental studies with direct involvement from teachers and students, is recommended to gain contextual insights into the challenges and benefits of using Google Classroom in real-world educational settings. Additionally, longitudinal studies should be conducted to examine the long-term impact of Google Classroom on students' academic achievement, motivation, and skill development, as most existing studies only focus on short-term effects.

Furthermore, future research could explore comparative studies between Google Classroom and other online learning platforms, such as Moodle, Edmodo, or Microsoft Teams, to determine the advantages and limitations of each platform in different educational contexts. Such comparisons would provide valuable insights

into the most effective features and functionalities for enhancing digital learning. Lastly, contextual analysis is necessary to investigate how factors like students' digital literacy, access to technology, and the role of school and parental support influence the effectiveness of Google Classroom. Understanding these contextual variables would help educators and policymakers develop more inclusive and data-driven educational strategies, ensuring that digital learning platforms effectively meet diverse student needs.

4. CONCLUSION

The use of Google Classroom has been proven effective in enhancing students' learning outcomes in online education. This platform provides flexibility for students to access learning materials at any time and fosters interaction with teachers. Additionally, Google Classroom supports independent learning through features such as assignment submission and online discussions. Studies indicate a significant improvement in students' academic performance and motivation after utilizing this platform. Overall, Google Classroom serves as an efficient and interactive solution for supporting remote learning.

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