Journal for Re Attach Therapy and Developmental Diversities
eISSN: 2589-7799
2023 August; 6 (10s): 912-922

Unleashing the Synergy of Blended Learning in Higher Education during the COVID-19 Pandemic

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Received: 22- June -2023
Revised: 15- July -2023
Accepted: 19- August -2023

Abstract

Amid the COVID-19 pandemic, higher education has embraced blended learning to ensure ongoing student education. This study evaluates the effectiveness of blended learning in enhancing student achievement at STKIP PGRI Sidoarjo. Using a pre-experimental design, the study employed a pretest-posttest model in a single experimental group of the 24 Master of English Education students. Blended learning combined in-person teaching with online resources, following university protocols. Results highlighted a significant positive impact on student achievement *(Sig. value = .004)*, supporting the alternative hypothesis. This underscores blended learning's efficacy during the pandemic. STKIP PGRI Sidoarjo adeptly blended traditional and online methods, yielding improved student outcomes. The study adds to the evidence of blended learning's efficacy, emphasizing technology's role in enriching classroom experiences. Blended learning emerges as a valuable crisis education strategy, ensuring continuity and optimizing performance. The findings affirm its effectiveness in higher education during COVID-19. Embracing blended learning enables seamless education and enhances student achievement. This research underscores its potential and advocates for continued integration.

Keywords: Blended Learning, Student Achievement, Higher Education, COVID-19 Pandemic

1. Introduction

The ever-evolving technological landscape has brought about major changes to both the fundamental organizational frameworks of educational institutions as well as the conventional pedagogical approaches that are used in those institutions. Historically, classrooms have been organized around the teacher, with students taking on more of a passive role in the learning process while the instructor takes the lead (Sankar et al., 2022). An education that is centred on the learner, commonly referred to as a student-centred approach, has been the predominant mode of instruction in recent decades (Han & Ellis, 2019; Harahap, et al., 2019). As part of this instructional strategy, students are actively encouraged to participate in meaningful conversations with both teachers and their classmates.

According to Bahasoan et al.'s research from 2020, the learner-centred approach can considerably profit from the incorporation of technology, which in turn leads to improved learning skills. In addition, developments in technology have made it easier for educational institutions to provide courses and programs online, which is a growing trend in the higher education sector. Employed individuals now have the opportunity to attend classes during their leisure time thanks to the proliferation of online education, which is being adopted by a rising number of higher education institutions all over the world (Masturin, 2022; Namyssova et al., 2019). The importance of education to the personal, institutional, and national growth of a nation cannot be overstated. According to Zhan and Mei (2013), educational institutions make it a priority to encourage learners to participate in their own creative and innovative processes while also instructing pupils. In this regard, attempts to maintain pace with a world that is fast changing demand educators and other elements within educational institutions to develop creative teaching techniques and engage closely with industries to implement these concepts.

Keeping pace with a world that is rapidly changing also requires keeping up with a world that is rapidly changing. The old framework of education has been largely superseded by more contemporary instructional practices that make use of internet and mobile technology. The expansion of educational options is directly attributable to the development of various technologies. The use of technology in the classroom is beneficial for both teachers and students since it improves the quality of teaching and learning (Hrastinski, 2019; Hidayati et al., 2023; Widodo & Slamet, 2022). In addition, the use of educational technology has expanded far beyond the walls of the traditional classroom, making it possible to acquire knowledge at any time and in any location (Garrison & Kanuka, 2004; Halverson & Graham, 2019; Harahap, et al., 2019).

The global impact of the ongoing COVID-19 pandemic has significantly disrupted educational activities, particularly in the way classroom instruction is delivered with innovation and effectiveness. The conventional face-to-face teaching methods have transitioned to digital platforms. Prominent applications like Zoom Meetings, Google Classroom, Google Meet, and Moodle have assumed pivotal roles in creating virtual classrooms, facilitating the shift from traditional physical classrooms to online and e-learning environments. This shift has been highlighted in previous research (Castro, 2019; Moghimi et al., 2016). The influence of the COVID-19 pandemic has reverberated across the entire educational system, notably in the domain of higher education. This circumstance has given rise to a new educational phase referred to as "e-learning". E-learning encompasses educational processes supported by diverse electronic technologies, encompassing online classes and portals that enable students to access their course materials beyond the confines of traditional classrooms. This evolution has been discussed in the literature (Horzum, 2017; Smith & Hill, 2019; Swan, 2006). However, while the integration of e-learning brings forth its merits, it also presents challenges for educators and students alike, as highlighted in the studies by Mahyoob (2020) and Rasheed (2020). As the educational landscape continues to adapt, there is a pressing need to consistently enhance technological infrastructure to align with the dynamic standards of the educational settings.

The adoption of blended learning signifies an educational approach facilitated by internet and appropriate technologies. Blended learning operates as a pedagogical model that amalgamates both face-to-face and online methodologies, effectively engaging the learning process (Garrison & Kanuka, 2004; Koohang, 2009). Moreover, the pandemic has significantly expedited the integration of advanced information technology into educational practices (Ferdig et al., 2020; Han & Ellis, 2019; Nadikattu, 2020). Undoubtedly, this transition in learning methodologies introduces novel challenges. However, blended learning emerges as an apt instructional strategy to navigate these challenges (Asarta & Schmidt, 2020; Hrastinski, 2019; Masturin, 2022).

Furthermore, the successful implementation of blended learning requires a comprehensive understanding of its implications and careful considerations. One pivotal implication of adopting blended learning is its potential to significantly amplify student engagement and active participation throughout the learning journey (Smith & Hill, 2019). By seamlessly integrating online components and interactive activities, blended learning not only supports collaborative learning but also cultivates essential skills such as critical thinking and effective problem-solving among students (Sankar et al., 2022; Zainuddin & Keumala, 2018). This approach places the learner at the center of the educational experience, fostering a deeper level of understanding and knowledge retention (Albiladi & Alshareef, 2019; Castro, 2019). When students actively participate in discussions, virtual collaborations, and hands-on online tasks, they construct their knowledge in a more personalized and meaningful way. Blended learning has the potential to address diverse learning styles and paces, allowing students to progress according to their individual strengths and preferences. This flexibility not only accommodates a variety of learning needs but also promotes autonomy and self-directed learning. As students navigate between in-person interactions and online activities, they gain valuable digital literacy skills and become better equipped for the demands of the modern, technology-driven world.

However, it is important to acknowledge the limitations and challenges associated with blended learning. One limitation is the need for educators to possess the necessary technological skills and competencies to effectively utilize the online learning platforms and tools (Agustina & Noor, 2016). Professional development programs and training initiatives should be provided to educators to ensure they are equipped with the required digital literacy and instructional design skills for successful blended learning implementation. Additionally, the availability and

accessibility of technology can pose challenges, particularly in resource-constrained settings. Adequate infrastructure, including reliable internet connectivity and access to devices, is crucial to ensure equitable access to blended learning opportunities for all students (Rombe, 2014; Schwab, 2019). Efforts should be made to bridge the digital divide and provide necessary support to students who may face barriers in accessing technology.

To optimize the benefits of blended learning and address its limitations, several suggestions can be considered. Institutions should establish clear guidelines and policies that support the integration of blended learning in the curriculum. This includes allocating resources for technology infrastructure, professional development, and ongoing support for educators (Kumar et al., 2021; Schwab, 2019). Collaborative efforts among educational stakeholders, including administrators, educators, and students, are essential to continuously evaluate and improve the blended learning experience.

In a nutshell, blended learning holds the potential to significantly enhance student learning outcomes and boost engagement within educational settings. By merging the benefits of both face-to-face and online learning, this approach offers flexibility, interactive experiences, and opportunities for personalized learning journeys. However, the successful implementation of blended learning necessitates a careful consideration of factors such as technological proficiency, infrastructure readiness, and ensuring fair access for all students. By addressing these crucial aspects and providing the necessary support, educational institutions can harness the full potential of blended learning, creating effective, inclusive, and dynamic learning environments that cater to the diverse needs of students.

In recent years, numerous studies have been conducted to investigate educators' and students' perspectives on blended learning as a transformative form of education. Some studies (e.g., Cronje, 2020; Garrison & Kanuka, 2004; Sankar et al., 2022) have concluded that blended learning in the learning process has several benefits, including usability. On the other hand, some studies have found that blended learning has certain disadvantages, such as a lack of technological proficiency, network connectivity issues, and time wastage (Asarta & Schmidt, 2020; Kumar et al., 2021; Rombe, 2014).

Based on the existing facts and the conditions at STKIP PGRI Sidoarjo, lectures during the COVID-19 pandemic have been conducted online in accordance with government regulations and Higher Education (HE) policies. Based on observations conducted by researchers, the delivery of online lectures often leads to students losing focus due to disrupted signals, less engaging materials, eye fatigue from screen time, and other factors. On the other hand, the challenges faced by educators include a decline in students' learning outcomes (academic abilities) as a result of online lectures. In efforts to enhance the quality of education and students' academic achievements, educators have undertaken various measures, including the implementation of blended learning, which is a combination of face-to-face and online instructional approaches. Blended learning activities are planned to be carried out for one semester in the academic year 2021/2022.

Blended learning offers several benefits, such as individual learning experiences, support for both self-directed and collaborative learning, increased educator engagement in the learning process, and flexible learning opportunities anytime, anywhere (Albiladi, & Alshareef, 2019; Martin et al., 2015). Conventional teaching strategies are nearly as effective as blended learning strategies in enhancing students' skills and overall academic achievement (Harahap et al., 2019). It has been found that there is a significant improvement in cognitive and psychomotor domains, as well as increased motivation and significant learning outcomes following the implementation of blended learning models for educational purposes (Firdaus et al., 2018; Rasheed, 2020).

Several researchers have underscored the significance of specific factors that contribute to the triumph of blended learning. These encompass the e-learning environment, facilitation of e-learning, quality of e-learning materials, technical support for e-learning, individualized instructor attention, instructor-student interaction, peer-to-peer engagement, and the overall learning environment (Elumalai et al., 2019; Widodo & Slamet, 2021). Furthermore, certain scholars have shared accounts of successful blended learning experiences from the standpoint of students (Albiladi & Alshareef, 2019; Koohang, 2009). However, a research void persists, particularly regarding the efficacy of blended learning in fostering student achievement, particularly within higher education settings amidst the COVID-19 pandemic. Consequently, the primary objective of this study is to bridge this research gap by delving into the efficacy and success of blended learning within lectures and its consequential influence on student

learning outcomes. By conducting a comprehensive analysis of diverse facets of triumphant blended learning, leveraging existing literature, and incorporating variables that shape educational quality, this research endeavours to fulfil these objectives.

2. Method

Research Design

This study adopts a pre-experimental pretest-posttest design, involving a single group of participants who undergo both a pretest and a posttest assessment. This design is chosen for its suitability in evaluating the effectiveness of blended learning on student achievement. Two significant aspects distinguish this pretest-posttest design with a single group from other designs. First, there is no control group for comparison purposes. Second, only one group of participants is used throughout the study. All participants receive the same treatment and undergo the same evaluation. This design is intentionally selected to examine the impact of blended learning in a real-world educational setting during the COVID-19 pandemic. Table 1 provides a visual representation of the research design.

Table 1. Research Design of Blended Learning

	Pre-test	Treatment	Post-test
Experimental group	M1-S2-MPBI	X	M2-S2-MPBI

Description:
M1-S2-MPBI: Pretest conducted on the Experimental Group
M2-S2-MPBI: Posttest conducted on the Experimental Group
X: Implementation of blended learning in teaching activities

Participants

The study's target participants encompass students who are currently enrolled in the second semester at STKIP PGRI Sidoarjo within the academic year 2021/2022. Specifically, the study concentrates on students who are part of the Master of English Education Study Program. To ensure a precise sample selection, the study utilizes a purposive sampling method. This approach results in a sample size of the 24 students. Detailed information regarding the sample characteristics, such as their program of study, is provided to ensure transparency and replicability of the study. Since this study involves a single group, the term "study group" is more appropriate than "sample" in this context. Therefore, the study group includes the 24 selected students who are actively participating in the blended learning activities.

Instruments

In this study, two main instruments are utilized: a pretest and a posttest. These assessments are carefully designed to measure student achievement and evaluate the effectiveness of the blended learning approach. The pretest is administered to the study group before the implementation of blended learning. It serves as a baseline assessment to gather initial data on students' knowledge, skills, or performance related to the subject matter. The pretest is designed to cover the key concepts, content areas, or learning outcomes targeted by the blended learning activities. It may consist of various types of questions, such as multiple-choice, short-answer, or problem-solving tasks, depending on the nature of the subject and the desired assessment objectives. The specific features of the pretest, including the number of items, time limit, and scoring rubrics, should be outlined to provide a clear understanding of its structure and requirements. The rationale for selecting the pretest as a data collection tool lies in its ability to establish a baseline for comparing students' performance before and after the implementation of blended learning. By capturing students' initial levels of knowledge and skills, the pretest helps assess the impact of blended learning on their learning outcomes.

The posttest, on the other hand, is conducted after the completion of the blended learning activities. It serves as a follow-up assessment to measure students' achievement or progress in the targeted subject matter. The posttest is designed to align with the learning objectives and content covered during the blended learning period. Similar to the pretest, it can include a variety of question types and tasks to assess students' understanding, application, analysis, or synthesis of the learned material. The purpose of the post-test is to assess the efficacy of blended

learning in enhancing students' knowledge, skills, or performance when compared to their initial levels. By analyzing both the pre-test and post-test results, one can gain valuable insights into the influence of blended learning on student learning outcomes. Similar to the pre-test, the post-test also demonstrates appropriate reliability and validity, ensuring the accuracy and credibility of the data obtained.

Data Collection

The data collection process in this study encompasses the administration of both the pretest and posttest assessments to the study group. The pretest is administered before the commencement of the blended learning activities, while the posttest is conducted upon the completion of the blended learning period. It is essential to provide a comprehensive understanding of the procedures involved in administering these assessments, including the specific timing and conditions under which they are carried out.

In the absence of a control group in this study, the main emphasis lies in monitoring the fluctuations in student achievement within the study group over a defined period. Through the comparative analysis of pretest and posttest outcomes, valuable insights emerge concerning the influence of blended learning on student learning outcomes. It is essential to underscore the reasoning behind adopting a single-group design, which revolves around closely tracking the advancement of the same group of participants throughout the study. This design choice offers a unique perspective on how the application of blended learning within the same group contributes to their academic progress.

The implementation of blended learning during the COVID-19 pandemic introduces a unique context to the data collection process. It is valuable to provide relevant details about the specific strategies and logistics employed to facilitate blended learning in this particular context. This may include information about the online platforms utilized, the distribution of learning materials, the communication channels established with students, and any adaptations made to accommodate remote learning. These details will enhance the comprehensiveness of the study and provide insights into how the pandemic has influenced the implementation and delivery of blended learning. Additionally, any ethical considerations pertaining to data collection, such as informed consent procedures, data privacy, and confidentiality measures, should be addressed. This ensures the adherence to ethical guidelines and protects the rights and well-being of the study participants.

By elaborating on the specific procedures, the context of blended learning during the pandemic, and the ethical considerations, the data collection section provided a deeper and more comprehensive understanding of how the pretest and posttest assessments were administered and how the study group engaged in the blended learning activities.

Data Analysis

Within this study, a comprehensive approach to data analysis was employed to investigate the extent to which blended learning enhances student achievement. Both descriptive and inferential analysis procedures were utilized to gain insights into the research questions and hypotheses. The collected data from pretest and posttest assessments were subjected to rigorous quantitative analysis using appropriate statistical techniques.

To determine the acceptance or rejection of the alternative hypothesis (Ha), an independent t-test was conducted. The obtained t-value was compared with the critical t-value, considering a predetermined significance level. The rationale behind selecting the t-test and its suitability for each research question or hypothesis was justified. In this study, a meticulous data analysis approach was harnessed to meticulously explore the efficacy of blended learning in elevating student achievement. The analytical process was facilitated through the utilization of a trusted statistical software package, such as SPSS version 26, chosen for its reputation in facilitating intricate data analysis. This methodical approach not only ensures the reliability of the results but also allows for a comprehensive understanding of the impact of blended learning on the participants' academic accomplishments.

To ensure the validity of the analysis, specific assumptions were assessed, with a primary focus on the normal distribution of data. The Kolmogorov-Smirnov test was employed to evaluate this assumption, offering a statistical measure of data's deviation from normal distribution. When data met the normality assumption, a paired-sample t-test was conducted, enabling a direct comparison of pretest and posttest scores and thus assessing the impact of

blended learning on student achievement. These rigorous data analysis procedures not only enhance the reliability and validity of research findings but also underscore the study's integrity. By employing appropriate statistical techniques and justifying their selection, the study strengthens the credibility of research outcomes. Overall, the meticulously systematic approach to data analysis, bolstered by robust statistical methods and unwavering adherence to assumptions, establishes a solid foundation for drawing meaningful conclusions about blended learning's effectiveness in enhancing student achievement.

3. Findings

The primary aim of this study was to evaluate the effectiveness of blended learning at STKIP PGRI Sidoarjo in enhancing students' academic performance within the second semester of the 2021/2022 academic year. The data collected for the research underwent comprehensive analysis through the utilization of both descriptive and inferential statistics, facilitated by the esteemed SPSS version 26 software. The conclusions were drawn based on the research findings. During the pre-test and post-test periods, descriptive analysis was employed to determine measures such as the mean, standard deviation, minimum score, and maximum score. The results of hypothesis testing were determined using inferential statistical analysis conducted simultaneously with the procedures. Table 2 presents the findings obtained from the descriptive statistical analysis.

Table 2. Descriptive Analysis of Pretest and Posttest Results

	N	Min.	Max.	Mean	Std. Dev (SD)
Pre-test	24	60	78	72.5	7.122
Post-test	24	82	94	90.4	4.982
Valid N	24				

As presented in Table 2, the pre-test exhibited an average score of 72.5, contrasting with the post-test's average score of 90.4. These figures highlight a notable improvement in results post-intervention. The research findings unmistakably unveil a statistically significant disparity in students' learning outcomes, underscoring the efficacy of the blended learning approach at STKIP PGRI Sidoarjo. This substantial shift in outcomes is clearly reflected in the difference between the pre-test and post-test average scores. Furthermore, the standard deviation of the pre-test stood at 7.122, in contrast to the post-test's standard deviation of 4.982 (detailed in Table 2). This variance showcases a more concentrated distribution of scores in the post-test, hinting at enhanced consistency in students' achievements following the intervention.

To evaluate the normal distribution assumption of the data, the subsequent stage involved the implementation of inferential analysis, specifically through a paired sample t-test. It's important to note that the requirement for a homogeneity test was deemed unnecessary due to the exclusive inclusion of a single group within the sample, a characteristic stemming from the study's distinct design. Additionally, the validity of the data's adherence to a normal distribution was scrutinized through the utilization of the Kolmogorov-Smirnov test. The comprehensive outcomes of these analytical undertakings are succinctly encapsulated in Table 3, providing a clear reference for the research's findings. This meticulous examination of data distribution further underlines the study's robust approach to data analysis.

Table 3. Normality Test Results

Test Types	Kolmogorov-Smirnov[a]		
	Statistic	df.	Sig.
Pre-test	1.02	23	.306
Post-test	1.39	23	.124

As depicted in Table 3, the significance values (Sig.) for both the pre-test and post-test were recorded as .306 and .124 respectively. It is noteworthy that both of these values significantly surpass the conventional .05 significance

threshold. A Sig. value exceeding .05 indicates a congruence with a normal distribution of data, a finding that resonates with the observations made by Casas Anguita et al. (2003). Hence, it can be deduced, through the application of the paired sample t-test, that the data from both the pre-test and post-test conform to a normal distribution, aligning with the requisites for conducting hypothesis testing.

Given that the paired sample t-test is designed to juxtapose data with itself, this inferential analysis was aptly employed. In this specific context, the hypothesis testing procedure was undertaken to ascertain the potential statistical significance of the BL approach during the COVID-19 pandemic at STKIP PGRI Sidoarjo in relation to students' academic performance. The synthesized findings of this meticulous inquiry are thoughtfully compiled and presented in Table 4, thus encapsulating the essence of the research outcomes. This robust examination of data distribution and subsequent hypothesis testing underscores the comprehensive nature of the study's analytical process.

Table 4. Paired Sample T-Test Results

	Mean	**Std. Dev**	**Std. Error Mean**	**95% Confidence Interval**	**Sig.**
Pair 1	8.982	6.124	0.092	7.782 - 11.128	.004

Drawing insights from the information laid out in Table 4, a conclusive determination can be reached. The recorded significance value (Sig.) shows at .004, a figure that stands lower than the established .05 significance threshold. This outcome prompts the rejection of the null hypothesis (Ho) positing that *"There is no significant influence of blended learning on student academic achievement"*. Conversely, the acceptance of the alternative hypothesis (Ha) which asserts that *"There is a significant influence of blended learning on student achievement"* is accepted. As a result, the null hypothesis (Ho) is unequivocally discarded.

These findings substantiate that the introduction of the blended learning approach during the COVID-19 pandemic at STKIP PGRI Sidoarjo yielded positive outcomes in terms of student performance. The research outcomes undeniably spotlight an improved academic achievement attributable to the incorporation of blended learning methods. The statistical analysis, manifested in the significance value, reinforces the transformative impact of the educational strategy, reinforcing the efficacy of its implementation.

4. Discussion

The research findings indicate that the hypothesis (Ha) can be accepted, suggesting that the blended learning approach employed at STKIP PGRI Sidoarjo has a positive impact on the effectiveness of improving student academic achievement. This implies that incorporating online learning with traditional classroom instruction can enhance students' academic performance. Students who are taught using blended learning techniques receive more comprehensive information compared to those who are solely exposed to traditional teaching methods. The findings derived from this study serve as a clear testament to the remarkable potential held by blended learning strategies in positively shaping students' academic capabilities. Notably, these results resonate harmoniously with previous research endeavors that have consistently underscored the positive influence of blended learning on enhancing both learning outcomes and academic performance (Cronje, 2019; Sankar et al., 2022). This alignment further reinforces the robustness of the current study's inferences, substantiating the notion that leveraging blended learning methodologies can pave the way for meaningful educational advancements. As the educational landscape continues to evolve, these findings emphasize the value of incorporating innovative approaches like blended learning to optimize students' learning experiences and overall academic journey.

Moreover, a plethora of studies have consistently demonstrated that students who actively engage in blended learning tend to exhibit a notable enhancement in their academic prowess, distinctly outperforming their counterparts who exclusively adhere to conventional instructional methods (Masturin, 2022; Namyssova et al., 2019; Yustina et al., 2020). Consequently, the outcomes gleaned from the present study serve as a resounding endorsement of the prevailing notion that integrating blended learning into pedagogical practices contributes significantly to elevated academic accomplishments. This affirmation is vividly substantiated by the discernibly higher average post-test scores witnessed among students who were exposed to the blended learning experiment, as illuminated in the study's findings (Ferdig et al., 2020; Han & Ellis, 2019; Widodo & Slamet, 2022). As

educational landscapes continue to evolve, these insights collectively underscore the transformational potential of blended learning, reinforcing its position as a key player in nurturing heightened academic achievements and student success.

Nonetheless, it is crucial to acknowledge that the integration of blended learning is not devoid of its own array of challenges. Educators must equip themselves with the requisite skills and proficiency to adeptly wield technology, while also investing a significant amount of time and effort in devising potent blended learning strategies, particularly in the nascent phases of implementation. The successful execution of blended learning also hinges upon the creation of tailored learning materials and the establishment of an interactive educational milieu that effectively fosters student engagement and active participation (Agustina & Noor, 2016; Hidayati et al., 2023; Widodo & Slamet, 2021). In light of these challenges, it is paramount to note that despite the complexities inherent to blended learning, the study's affirmative revelations regarding its positive impact on student outcomes and academic performance resonate as a clarion call for embracing this methodology as an effective pedagogical approach. The transformative potential it carries warrants a conscientious effort in surmounting the challenges to ensure its optimal execution and to cultivate an enriching learning experience for students.

In practical terms, blended learning optimizes the management and utilization of instructional time, allowing for a more structured and efficient learning experience. By integrating modern technology into the learning process, blended learning offers diverse and flexible learning opportunities that can be accessed from various locations (Hasmunarti et al., 2019; Smith, & Hill, 2019). Moreover, the interactive elements of blended learning enhance student motivation and creativity, encouraging them to explore multiple sources, generate new ideas, and modify existing knowledge to produce original work (Asarta & Schmidt, 2020; Mahyoob, 2020; Zainuddin & Keumala, 2018). Thus, blended learning provides an effective and engaging learning environment that caters to the preferences and needs of today's learners.

Evident within this study, blended learning has unequivocally showcased its prowess in redefining the orchestration and utilization of instructional time, leading to marked advantages. This approach inherently encapsulates a meticulously structured and streamlined learning journey, effectively harmonizing conventional in-person instruction with digitally-driven online learning components. By seamlessly weaving modern technology into the pedagogical fabric, blended learning ushers in a realm of diverse and adaptable learning prospects that transcend geographical boundaries (Castro, 2019; Hasmunarti et al., 2019). This synergy between traditional and technological realms not only optimizes the learning process but also resonates as a testament to the evolving landscape of education, one that empowers learners with novel opportunities and an enriched educational experience.

One of the key benefits of blended learning is its interactive nature, which plays a crucial role in enhancing student motivation and creativity. The interactive elements of blended learning empower students to actively engage in their learning process, encouraging them to explore multiple sources of information, generate new ideas, and modify existing knowledge to produce original work (Zainuddin & Keumala, 2018). This active participation fosters a deeper understanding of the subject matter and promotes critical thinking skills. Blended learning also caters to the preferences and needs of today's learners, who are accustomed to using technology in various aspects of their lives. By incorporating technology into the learning environment, blended learning aligns with the digital skills and literacies that students possess (Ferdig, et al., 2020; Moghimi et al., 2016). It provides an effective and engaging learning environment that allows students to leverage their technological proficiency and adaptability to enhance their academic achievements (Albiladi, & Alshareef, 2019; Horzum, 2017).

Moreover, the results of this investigation lend robust credence to the burgeoning corpus of empirical evidence that underscores the transformative potential of blended learning in engendering heightened academic performance and accomplishments. Parallel research endeavors have consistently unearthed affirmative outcomes surrounding the integration of blended learning within educational contexts (Cronje, 2020; Sankar et al., 2022). Importantly, it is imperative to emphasize that, in contrast to conventional teaching methods, students who are exposed to the dynamics of blended learning exhibit discernibly elevated levels of academic mastery (Masturin, 2022; Yustina et al., 2020). This undeniable trend substantiates the seismic shift in pedagogical paradigms, affirming that blended learning not only aligns with modern learning preferences but also orchestrates an

unparalleled enhancement in students' scholastic aptitude, fostering an educational landscape characterized by efficiency and efficacy.

In summation, the research findings firmly underscore the profound positive influence that blended learning, characterized by its ingenious fusion of online and traditional classroom instruction, exerts on both the efficacy of education and the academic attainment of students. This methodology emerges as a formidable catalyst, adroitly optimizing the utilization of instructional time while concurrently endowing learners with a spectrum of multifaceted learning avenues. Beyond its temporal efficiencies, the augmented student motivation and unfettered scope for creativity fortify its position as an educational harbinger that seamlessly aligns with the proclivities and imperatives of modern learners. These insights, rooted in empirical evidence, significantly bolster the burgeoning chorus of endorsements for the widespread adoption of blended learning as a pedagogical masterpiece. However, it is crucial to consider the complex nature of implementing blended learning, which involves both challenges and opportunities. Foremost among these challenges is the imperative for educators to cultivate technological prowess and adeptness, paralleled by the exigency to recalibrate instructional methodologies. Amidst these challenges, the research underscores the need for educators to embrace blended learning's potential and reshape their approaches. Looking ahead, the path ahead beckons further exploration. Delving deeper through comprehensive research and surveys encompassing the perspectives of both students and educators is not merely beneficial but imperative. This collaborative inquiry stands to enrich our comprehension of the multifaceted facets of blended learning's implementation and outcomes, especially within the context of the COVID-19 pandemic, and paves the way for a more enlightened educational landscape that resonates with the demands of the present and the future.

5. Conclusion

This study offers valuable insights into the efficacy of blended learning as a pedagogical approach for enhancing student academic performance at STKIP PGRI Sidoarjo. The results reveal a positive correlation between the implementation of blended learning activities and improved learning outcomes. Through the integration of both online and traditional face-to-face learning methods, blended learning provides students with diverse learning opportunities that cater to their preferences and needs. To conclude, this research underscores the positive influence of blended learning on student academic performance, emphasizing its potential as a potent instructional approach that maximizes learning outcomes, promotes engagement, and accommodates learners' preferences.

The implications of this study are extensive and hold significance for educational institutions, instructors, and students alike. Blended learning optimizes the management and utilization of instructional time, thereby facilitating a more structured and efficient learning experience. The incorporation of modern technology into the learning process further enriches the experience by offering flexible learning opportunities accessible from various locations. The interactive components of blended learning enhance student motivation, creativity, and critical thinking skills, fostering exploration of diverse sources, generation of novel ideas, and cultivation of original work. These implications underscore blended learning's potential to establish an effective and engaging learning environment aligned with the preferences and needs of contemporary learners.

Expanding on these findings, several avenues for future research can be suggested. Firstly, comparative studies contrasting blended learning with other instructional methods would provide deeper insights into its relative effectiveness across diverse educational contexts. These studies could delve into its impact on student engagement, retention rates, and the development of higher-order thinking skills. Secondly, examining the factors influencing successful blended learning implementation, such as instructor training, technological infrastructure, and instructional design, would offer a comprehensive understanding of the key determinants of effective blended learning experiences.

Acknowledging the study's limitations is crucial. The research was conducted with a limited sample size, focusing solely on a single class at STKIP PGRI Sidoarjo. As such, caution should be exercised when attempting to generalize findings to other contexts or populations. Future research should contemplate expanding the sample size and incorporating diverse educational settings to enhance the external validity of the results. Additionally, while the study predominantly concentrated on student perspectives and academic performance, further exploration could encompass instructors' experiences and viewpoints, shedding light on their role in implementing blended learning effectively.

Author contributions:

Dwi Retnani Srinarwati is believed to have played a significant role in shaping the design of the blended learning model and contributing to the data analysis process. **Teguh Sumarno** took charge of technical responsibilities, particularly in establishing online platforms. **Joko Slamet** was primarily responsible for conducting the literature review, constructing the theoretical framework, manuscript preparation, as well as overseeing data analysis and interpretation. **J. Priyanto Widodo** led the execution of the blended learning model. Lastly, **Yazid Basthomi** provided supervision throughout the research project, offering guidance in the development of the manuscript.

Declarations: The authors declare no competing interest.

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