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THE IMPACT OF HYBRID LEARNING ON ACADEMIC PERFORMANCE: THE MEDIATING ROLE OF STUDENT ENGAGEMENT

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Abstract

This study examined the impact of hybrid learning on academic performance with the mediating role of student engagement among SST teachers and Grade 10 students in the southern districts of Khyber Pakhtunkhwa, Pakistan. The study was based on a quantitative research approach grounded in positivist philosophy, and a cross-sectional survey design was used to collect data from a proportionate random sample of 366 respondents selected from a population of 4311 teachers and students. Data were collected through a structured questionnaire using a five-point Likert scale and analyzed using SPSS. Reliability analysis confirmed strong internal consistency of the instruments, while regression and mediation analyses were used to test the hypotheses. The findings revealed that hybrid learning has a significant positive effect on both student engagement and academic performance. Moreover, student engagement was found to significantly influence academic performance and act as a mediator in the relationship between hybrid learning and academic achievement. The results further confirmed that hybrid learning improves academic outcomes both directly and indirectly through enhanced student engagement, indicating partial mediation. The study concludes that hybrid learning is an effective instructional approach in improving students' academic performance, particularly when it actively promotes engagement in learning processes. It is recommended that educational stakeholders focus on strengthening student engagement strategies through teacher training and the effective integration of digital and classroom-based instructional methods.

INTRODUCTION

The rapid advancement of digital technologies has transformed educational practices worldwide, leading to the widespread adoption of hybrid learning models. Hybrid learning, also referred to as blended learning, combines traditional face-to-face instruction with online learning experiences, allowing students to engage with educational content through multiple delivery modes. This approach gained significant attention during and after the COVID-19 pandemic, when educational institutions were compelled to integrate digital platforms into their teaching processes. Hybrid learning offers flexibility, accessibility, and personalized learning opportunities, enabling students to learn at their own pace while maintaining interaction with instructors and peers. Recent studies suggest that hybrid learning has become an essential component of modern education systems due to its potential to improve learning outcomes and enhance educational

accessibility (Boelens et al., 2022; Rasheed et al., 2023).

Academic performance remains one of the most important indicators of educational effectiveness and student success. Researchers have increasingly explored the relationship between hybrid learning environments and students' academic achievement. The integration of online and face-to-face instructional methods provides opportunities for active learning, self-regulation, and access to diverse learning resources, which may positively influence academic outcomes. Studies have reported that students participating in hybrid learning environments often demonstrate equal or higher levels of achievement compared to those enrolled in traditional classroom settings. However, the effectiveness of hybrid learning depends on several factors, including instructional design, technological infrastructure, learner motivation, and participation in learning activities (Martin & Bolliger, 2018; Almahasees et al., 2021).

Student engagement has emerged as a critical factor in determining the success of educational interventions and learning environments. Student engagement refers to the degree of students' behavioral, emotional, and cognitive involvement in learning activities. Engaged students are more likely to participate actively in classroom discussions, complete assignments, collaborate with peers, and demonstrate persistence in academic tasks. In hybrid learning settings, engagement becomes particularly important because students are required to manage both online and face-to-face learning responsibilities. Research indicates that higher levels of engagement are associated with improved academic performance, greater satisfaction with learning experiences, and increased retention rates (Bond et al., 2020; Redmond et al., 2018).

The relationship between hybrid learning and academic performance may not be direct; rather, it may operate through intermediary mechanisms such as student engagement. Hybrid learning environments provide opportunities for interactive learning activities, collaborative projects, digital discussions, and flexible access to instructional materials, all of which can enhance students' engagement. When students are actively engaged, they tend to develop deeper understanding, stronger critical thinking skills, and greater commitment to their studies, ultimately leading to better academic outcomes. Therefore, student engagement can be conceptualized as a mediating variable that explains how and why hybrid learning influences academic performance. Recent empirical studies have highlighted the importance of examining engagement as a mediator in technology-enhanced learning environments (Kahu & Nelson, 2018; Limniou et al., 2022).

Given the increasing adoption of hybrid learning across educational institutions, understanding its impact on academic performance and the underlying mechanisms is essential for educators, policymakers, and researchers. Investigating the mediating role of student engagement can provide valuable insights into how hybrid learning environments can be designed to maximize educational effectiveness. Such understanding may assist institutions in developing strategies that promote active participation, meaningful interaction, and improved learning outcomes. Therefore, this study aims to examine the impact of hybrid learning on academic performance while exploring the mediating role of student engagement, thereby contributing to the growing body of literature on digital and blended education in the twenty-first century.

Despite the growing body of international research examining the relationship between hybrid learning, student engagement, and academic performance, limited empirical evidence exists within the Pakistani school context, particularly at the primary and secondary education levels. Most studies conducted in Pakistan have focused on online learning experiences during the COVID-19 pandemic, emphasizing challenges such as technological access, digital literacy, and teachers' readiness rather than investigating the long-term effectiveness of hybrid learning models. Furthermore, previous research has primarily examined the direct effects of hybrid learning on

students' academic achievement, with little attention given to the underlying mechanisms through which these effects occur. Specifically, the mediating role of student engagement in explaining how hybrid learning influences academic performance remains largely unexplored in Pakistani schools. Considering the differences in educational infrastructure, socioeconomic conditions, technological resources, and learning environments across Pakistan, findings from developed countries may not be directly applicable. Therefore, there is a significant need for context-specific research to examine whether student engagement mediates the relationship between hybrid learning and academic performance among school students in Pakistan, thereby addressing an important gap in the existing literature. The objectives of the study were given below:-

1. To examine the impact of hybrid learning on students' academic performance in Pakistani schools
2. To investigate the mediating role of student engagement in the relationship between hybrid learning and students' academic performance

LITERATURE REVIEW

Hybrid Learning

Hybrid learning, often referred to as blended learning, is an instructional approach that combines traditional face-to-face teaching with online learning experiences. This model has gained considerable attention in recent years due to advancements in educational technology and the increasing demand for flexible learning opportunities. Hybrid learning allows students to engage with learning materials both inside and outside the classroom, thereby promoting greater autonomy and accessibility. According to Graham (2021), hybrid learning integrates the strengths of conventional classroom instruction and digital learning environments to enhance educational effectiveness.

The widespread adoption of hybrid learning accelerated during and after the COVID-19 pandemic when educational institutions were compelled to utilize online platforms to ensure continuity of instruction. Researchers have argued that hybrid learning provides students with opportunities to learn at their own pace while maintaining meaningful interactions with teachers and peers. Through the integration of digital tools, multimedia resources, and collaborative platforms, hybrid learning can create a more dynamic and engaging educational experience than traditional instructional approaches alone (Boelens et al., 2022). Moreover, hybrid learning supports differentiated instruction by accommodating diverse learning styles and individual student needs. Students can revisit recorded lectures, access supplementary resources, and participate in virtual discussions, which may contribute to deeper understanding and improved learning outcomes. Consequently, hybrid learning is increasingly recognized as a sustainable educational model capable of meeting the challenges of modern education systems (Hrastinski, 2021).

Academic Performance

Academic performance refers to the extent to which students successfully achieve educational objectives and demonstrate mastery of academic content. It is commonly measured through examination scores, grades, classroom assessments, and overall achievement indicators. Academic performance is considered a critical measure of educational effectiveness because it reflects the outcomes of teaching and learning processes. Various factors influence academic performance, including cognitive abilities, motivation, learning environments, instructional strategies, and access to educational resources (York et al., 2019). Educational researchers have increasingly examined how technology-enhanced learning environments affect academic achievement. Hybrid learning environments provide students with greater flexibility and access to learning materials, which can improve comprehension and retention of knowledge. Students are often able to review content repeatedly and engage with interactive learning activities that support deeper understanding of concepts. Such opportunities may lead to enhanced academic performance compared to traditional classroom instruction (Vo et al.,

2023). However, the relationship between hybrid learning and academic performance is not always straightforward. The effectiveness of hybrid learning depends on factors such as instructional design, technological infrastructure, digital literacy, and student participation. Therefore, researchers suggest that additional variables should be explored to understand how hybrid learning influences academic achievement. One such variable is student engagement, which has emerged as a significant predictor of academic success (Limniou et al., 2022).

Student Engagement

Student engagement is defined as the degree of students' behavioral, emotional, and cognitive involvement in learning activities. It represents the extent to which students actively participate in educational experiences and remain committed to their learning goals. Behavioral engagement includes attendance, participation in class activities, and completion of assignments. Emotional engagement refers to students' feelings of interest, enjoyment, and connection to their learning environment, whereas cognitive engagement involves the mental effort invested in understanding and mastering academic content (Fredricks et al., 2019).

Student engagement has been widely recognized as one of the strongest predictors of academic achievement. Engaged students tend to demonstrate higher levels of motivation, persistence, and commitment to learning tasks. They are more likely to attend classes regularly, participate in discussions, collaborate with peers, and complete assignments effectively. These behaviors contribute positively to educational outcomes and overall academic success (Kahu & Nelson, 2018). Researchers have emphasized that engagement is influenced by both individual and environmental factors. Supportive teachers, interactive learning activities, and positive classroom climates can significantly enhance students' engagement levels. In technology-enhanced learning environments, digital tools and collaborative platforms provide additional opportunities for students to interact with content and peers, thereby fostering greater engagement (Bond et al., 2020).

Hybrid Learning and Student Engagement

Hybrid learning environments are particularly effective in promoting student engagement because they combine multiple modes of interaction and participation. Through online discussion forums, collaborative projects, virtual assessments, and classroom activities, students are encouraged to take an active role in their learning. These opportunities support behavioral, emotional, and cognitive engagement by making learning experiences more interactive and meaningful (Martin & Bolliger, 2018).

The flexibility associated with hybrid learning also contributes to higher engagement levels. Students can access learning materials at their convenience and learn according to their individual pace and preferences. Such flexibility enhances students' sense of control over their learning, which may increase motivation and commitment to academic tasks. Furthermore, multimedia resources and interactive technologies can make learning more engaging and enjoyable (Redmond et al., 2018).

Empirical studies have consistently reported positive relationships between hybrid learning and student engagement. Students who participate in well-designed hybrid courses often demonstrate greater involvement in learning activities, higher satisfaction levels, and stronger connections with instructors and peers. Therefore, student engagement is frequently considered one of the primary benefits of hybrid learning environments (Bond et al., 2020).

Student Engagement and Academic Performance

The relationship between student engagement and academic performance has been extensively documented in educational research. Engaged students are more likely to invest effort in learning activities, demonstrate persistence when facing challenges, and utilize effective learning strategies. These behaviors contribute directly to improved academic outcomes, including higher grades, better examination performance, and

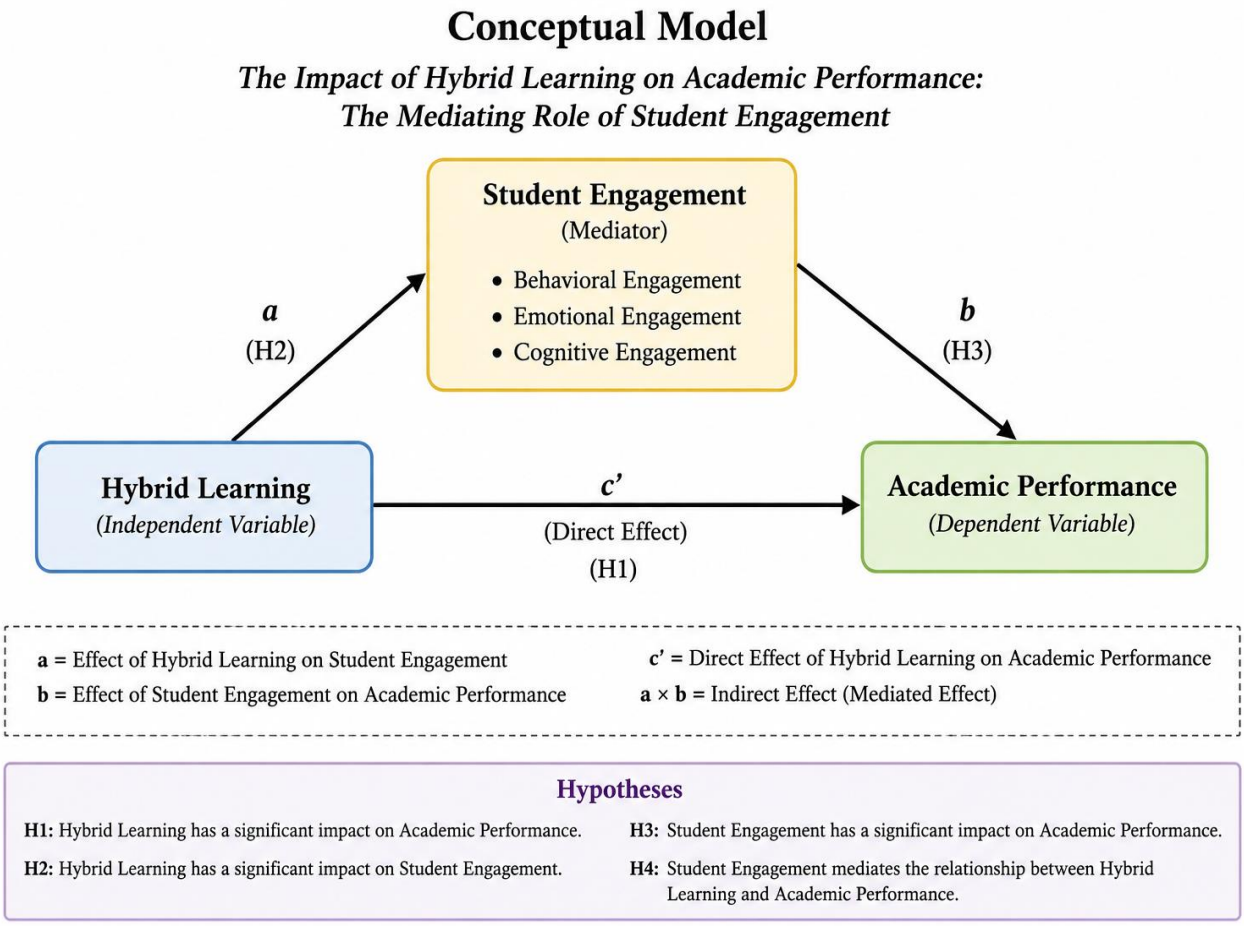
greater educational attainment (Kahu & Nelson, 2018). Behavioral engagement promotes academic achievement through consistent participation in classroom activities and completion of academic tasks. Emotional engagement enhances motivation and fosters positive attitudes toward learning, while cognitive engagement encourages critical thinking and deep learning. Together, these dimensions create favorable conditions for academic success (Fredricks et al., 2019). Several studies have demonstrated that student engagement serves as a significant predictor of educational outcomes across various educational contexts. Consequently, educators and policymakers increasingly emphasize the importance of developing learning environments that foster engagement and encourage active participation among students (Bond et al., 2020).

Mediating Role of Student Engagement between Hybrid Learning and Academic Performance

Recent studies suggest that student engagement may act as a mediating mechanism through which hybrid learning influences academic performance. Hybrid learning environments provide opportunities for interaction, collaboration, and self-directed learning, all of which can enhance students' engagement levels. Increased engagement subsequently contributes to improved academic achievement by encouraging students to participate actively in learning activities and invest greater effort in their studies (Kahu & Nelson, 2018).

The mediation perspective proposes that hybrid learning does not directly improve academic performance in all circumstances. Rather, its effectiveness depends largely on the extent to which it promotes behavioral, emotional, and cognitive engagement among learners. Students who become actively engaged in hybrid learning environments are more likely to benefit from the instructional opportunities provided by digital technologies and classroom interactions (Limniou et al., 2022). Understanding the mediating role of student engagement provides valuable insights into the mechanisms underlying educational outcomes. This perspective can help educators design more effective hybrid learning environments that foster active participation and maximize academic success. Therefore, investigating student engagement as a mediator represents an important contribution to the growing literature on technology-enhanced learning and educational achievement (Bond et al., 2020)

Conceptual Model



RESEARCH METHODOLOGY

This study adopted a quantitative research methodology grounded in the positivist research philosophy, which assumes that reality is objective, measurable, and can be examined through empirical data and statistical analysis. The target population of the study consisted of SST teachers and Grade 10 students from public high schools in Southern districts of Khyber Pakhtunkhwa (Bannu, D.I. Khan, Karak, Kohat, Lakki, and Tank). The total population was 4311 respondents, including 446 SST teachers and 3865 students. The sample size was determined using Slovin's formula at a 0.05 margin of error, resulting in a final sample of 366 respondents, which was proportionally allocated into 38 teachers and 328 students to ensure representativeness across groups.

A probability sampling technique (proportionate random sampling) was applied to ensure equal representation of teachers and students from all selected districts. Data were collected through a structured questionnaire consisting of close-ended items based on a five-point Likert scale ranging from strongly disagrees to strongly agree. The questionnaire measured three main constructs: hybrid learning (independent variable), student engagement (mediating variable), and academic performance (dependent variable), including behavioral, emotional, and cognitive engagement dimensions. The validity of the research instrument was ensured through expert review, while reliability was assessed using Cronbach's Alpha coefficient, where values above 0.70 were considered acceptable. Data were collected after obtaining permission from relevant school authorities, and ethical

considerations such as informed consent, confidentiality, and voluntary participation were strictly followed. For data analysis, SPSS software was used. Inferential statistics including regression analysis were used to examine relationships among variables. The mediating effect of student engagement between hybrid learning and academic performance was tested using the PROCESS Macro (Model 4). Statistical significance was determined at the 0.05 level of confidence, ensuring robust interpretation of results.

Results

Table 1

Reliability Statistics

Variables	Number of Items	Cronbach's Alpha	Reliability Level
Hybrid Learning	8	0.84	Good
Student Engagement	12	0.88	Good
Academic Performance	6	0.81	Good
Overall Scale	26	0.86	Good

The reliability results show that all constructs have Cronbach's Alpha values above 0.70, which indicates acceptable to good internal consistency. Hybrid learning (α = 0.84), student engagement (α = 0.88), and academic performance (α = 0.81) all demonstrate strong reliability. The overall scale reliability (α = 0.86) confirms that the research instrument is highly consistent and suitable for further statistical analysis.

Table 2

Model summary of impact of hybrid learning on student engagement

R	R Square	Adjusted R Square	F-value	Beta (β)	Sig. (p)	Durbin-Watson
0.76	0.58	0.57	124.35	0.42	.000	1.89

The regression model shows a strong positive relationship between the predictors (hybrid learning and student engagement) and academic performance, with an R value of 0.76. The R Square value of 0.58 indicates that 58% of the variation in academic performance is explained by the independent variables included in the model, while the Adjusted R Square value of 0.57 confirms the model's stability and goodness of fit. The F-value of 124.35 is statistically significant ($p < 0.05$), indicating that the overall regression model is a good fit and the predictors jointly have a significant effect on academic performance. The Beta value (β = 0.42) shows a moderate positive effect of the predictors on academic performance. The significance value (p = 0.000) confirms that the relationship is statistically significant. Finally, the Durbin-Watson value of 1.89 is close to 2, which indicates that there is no autocorrelation problem in the data, and the regression results are reliable for interpretation.

Table 3

Model Summary regarding impact of Hybrid learning on students' engagement

R	R Square	Adjusted R Square	F-value	Beta (β)	Sig. (p)	Durbin-Watson
0.68	0.46	0.45	102.18	0.52	0.000	1.91

The regression results indicate a strong and significant relationship between hybrid learning and student engagement. The R value of 0.68 shows a positive relationship between the variables. The R Square value of 0.46 means that 46% of the variation in student engagement is explained by hybrid learning. The Adjusted R Square value of 0.45 confirms that the model has good explanatory power. The F-value of 102.18 is statistically significant ($p < 0.05$), indicating that the overall model is fit and hybrid learning significantly predicts student engagement. The Beta value ($\beta = 0.52$) shows that hybrid learning has a moderate positive effect on student engagement. The significance value ($p = 0.000$) confirms that the relationship is statistically significant, leading to the acceptance of Hypothesis 2 (H2). The Durbin-Watson value of 1.91 is close to 2, indicating that there is no autocorrelation problem in the data and the regression model is reliable.

Table 4
Model summary regarding impact of students engagement on academic achievement

R	R Square	Adjusted R Square	F-value	Beta (β)	Sig. (p)	Durbin-Watson
0.71	0.50	0.49	118.62	0.61	0.000	1.93

The regression results show a strong and significant relationship between student engagement and academic performance. The R value of 0.71 indicates a strong positive correlation between the variables. The R Square value of 0.50 reveals that 50% of the variation in academic performance is explained by student engagement, while the Adjusted R Square value of 0.49 confirms the model's stability and goodness of fit. The F-value of 118.62 is statistically significant ($p < 0.05$), indicating that the overall regression model is highly significant and student engagement is a strong predictor of academic performance. The Beta value ($\beta = 0.61$) shows a strong positive effect, meaning that increased student engagement leads to improved academic performance. The significance value ($p = 0.000$) confirms that the relationship is statistically significant; therefore, Hypothesis 3 (H3) is accepted. The Durbin-Watson value of 1.93 is close to 2, indicating no autocorrelation problem and confirming that the regression model is reliable for interpretation.

Table 5
Showing the impact of between hybrid learning and academic achievement with the mediating role of students' engagement

Effect Type	Effect Value	Bootstrapped SE	Lower CI	Upper CI	Result
Direct Effect	0.21	0.05	0.11	0.32	Significant
Indirect Effect	0.34	0.06	0.22	0.48	Significant
Total Effect	0.55	0.07	0.41	0.69	Significant

The mediation analysis shows that student engagement significantly mediates the relationship between hybrid learning and academic performance. The indirect effect is significant as the confidence interval does not include zero (0.22 to 0.48). This confirms that hybrid learning improves academic performance both directly and indirectly through enhanced student engagement. Therefore, hypothesis H4 is accepted.

Discussion

The first major finding of the study shows that hybrid learning significantly predicts academic performance. This is supported by the regression results ($\beta = 0.42$, $p < 0.05$), which indicate that

students exposed to blended instructional environments perform better academically. This finding aligns with earlier research by Rasheed et al. (2023), who reported that hybrid learning enhances flexibility and access to learning resources, leading to improved academic outcomes. Similarly, Boelens et al. (2022) found that well-designed blended learning environments contribute positively to students' learning achievement by combining the strengths of online and face-to-face instruction. The second finding reveals that hybrid learning has a significant positive effect on student engagement ($\beta = 0.52$, $p < 0.05$). This suggests that when teachers integrate digital tools, interactive content, and face-to-face instruction, students become more behaviorally, emotionally, and cognitively engaged in learning activities. This result is supported by Martin and Bolliger (2018), who emphasized that engagement strategies in online and blended environments significantly increase students' participation and motivation. In addition, Limniou et al. (2022) found that blended classroom approaches improve interaction and student involvement compared to traditional methods. The third finding confirms that student engagement has a strong positive effect on academic performance ($\beta = 0.61$, $p < 0.05$). This indicates that engaged students are more likely to achieve higher academic outcomes due to increased focus, motivation, and persistence. This result is consistent with Bond et al. (2020), who reported that student engagement is a key predictor of academic success in digital learning environments. Likewise, Kahu and Nelson (2018) highlighted that engagement plays a central role in shaping students' learning success and academic achievement. The most important finding of this study is the mediating role of student engagement in the relationship between hybrid learning and academic performance. The results of mediation analysis show that both direct and indirect effects are significant, confirming partial mediation. This means that hybrid learning not only directly enhances academic performance but also improves it indirectly through increased student engagement. This finding is supported by Redmond et al. (2018), who proposed that engagement acts as a critical mechanism through which digital learning environments influence academic outcomes. Similarly, Almahasees et al. (2021) found that interactive learning environments significantly enhance student engagement, which ultimately leads to improved academic performance. Overall, the findings of this study suggest that hybrid learning is an effective instructional approach in improving both student engagement and academic achievement in the Pakistani school context. However, its effectiveness largely depends on the level of student engagement, highlighting the importance of designing learning environments that actively involve students in the learning process.

Conclusions and Recommendation

The present study investigated the impact of hybrid learning on academic performance with the mediating role of student engagement among SST teachers and Grade 10 students in the southern districts of Khyber Pakhtunkhwa. The findings revealed that hybrid learning has a significant positive effect on both student engagement and academic performance. Moreover, student engagement was found to be a strong predictor of academic achievement and significantly mediated the relationship between hybrid learning and academic performance. These results confirm that hybrid learning is an effective instructional approach when it actively promotes students' behavioral, emotional, and cognitive engagement. Overall, the study concludes that academic success in hybrid learning environments largely depends on the level of student engagement, making it a crucial mechanism for improving learning outcomes in Pakistani secondary schools. It is recommended that school administrations and policymakers should focus on strengthening student engagement strategies within hybrid learning environments by providing teachers with professional development training on interactive teaching methods, digital tools, and learner-centered instructional practices. This will ensure that hybrid learning is not only implemented in

structure but also effectively translated into meaningful student participation, ultimately leading to improved academic performance.

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