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Exploring the Effectiveness of Hybrid Learning Models in Higher Education Post-Pandemic

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Abstract:
This study explores the effectiveness of hybrid learning models in higher education following the COVID-19 pandemic. Hybrid learning, which combines online and face-to-face instruction, became a widely adopted approach during the pandemic, and its potential to enhance student learning and engagement in the post-pandemic era is a critical area of investigation. The research aims to evaluate the impact of hybrid learning on student performance, engagement, and satisfaction, while also identifying the challenges and benefits associated with its implementation. Data were collected through a mixed-methods approach, including surveys, interviews, focus groups, and institutional data analysis. Quantitative data were analyzed to compare student performance and engagement in hybrid versus traditional learning environments, while qualitative insights were gathered from students, faculty, and administrators to understand their perceptions and experiences. The findings indicate that while hybrid learning offers significant benefits, such as flexibility and increased accessibility, it also presents challenges related to technological access, time management, and institutional support. Variability in the effectiveness of hybrid learning was observed across different academic disciplines and institutions, with some disciplines adapting more successfully than others. The study concludes with recommendations for enhancing hybrid learning practices in higher education, emphasizing the need for tailored approaches that consider disciplinary differences and institutional contexts.

Introduction (مقدمة)

The COVID-19 pandemic brought unprecedented challenges to the education sector, forcing institutions to rethink and restructure their teaching models. Traditional face-to-face instruction was no longer feasible during lockdowns and social distancing measures, leading to the rapid adoption of hybrid learning models. Hybrid learning, which combines online and in-person instruction, emerged as a flexible and resilient approach, allowing educational continuity while addressing the diverse needs of students and faculty (Friedman & Garcia, 2020). This model enabled institutions to navigate the complexities of the pandemic by leveraging technology to supplement and enhance traditional teaching methods (Miller et al., 2021).

As the pandemic subsided, the hybrid learning model continued to gain traction, evolving from a temporary solution to a potentially permanent fixture in higher education. The shift towards hybrid learning reflects a broader trend of integrating digital tools into education, offering a blend of synchronous and asynchronous learning opportunities (Garrison & Kanuka, 2004). This transition marks a significant departure from traditional educational paradigms, emphasizing the need to understand how hybrid learning impacts student outcomes and the overall educational experience (Means et al., 2013). As hybrid learning becomes more prevalent, it is essential to explore its effectiveness and potential long-term benefits and challenges (Picciano, 2009).

With the continued integration of hybrid learning models in higher education, it becomes crucial to assess their effectiveness in the post-pandemic era. While initial studies during the pandemic highlighted the immediate benefits of hybrid learning, such as increased flexibility and accessibility, there is still limited understanding of how these models perform in a stable, post-crisis environment (Hodges et al., 2020). The effectiveness of hybrid learning in improving student academic performance, engagement, and satisfaction needs to be critically evaluated to determine its viability as a long-term educational strategy (Bernard et al., 2014).

Moreover, as higher education institutions consider permanently adopting hybrid learning models, there is a pressing need to identify the challenges and benefits from multiple perspectives, including those of students, faculty, and administrators (Moskal et al., 2013). Understanding these perspectives will provide a more comprehensive view of the practical implications of hybrid learning, guiding institutions in making informed decisions about its implementation (Garrison & Vaughan, 2008). This research seeks to address these gaps by examining the effectiveness and sustainability of hybrid learning in the evolving landscape of higher education (Graham, 2013).

This study aims to evaluate the effectiveness of hybrid learning models on student performance, engagement, and satisfaction in higher education. By focusing on these key areas, the research will provide insights into whether hybrid learning can meet or exceed the outcomes achieved through traditional teaching methods (Dziuban et al., 2018). Additionally, the study seeks to explore how hybrid learning models influence students' motivation and their overall learning experience, offering a nuanced understanding of the benefits and drawbacks of this approach (Vo et al., 2017).

Furthermore, the research aims to identify the specific challenges and benefits associated with hybrid learning from the perspectives of students, faculty, and administrators. These insights will help in developing strategies to enhance the effectiveness of hybrid learning and address potential barriers to its successful implementation (Bower et al., 2015). By understanding these dynamics, the study will contribute to the broader discourse on how

higher education can adapt to and optimize hybrid learning in a post-pandemic world (Crawford et al., 2020).

The primary research questions guiding this study are designed to explore the effectiveness and perceptions of hybrid learning in higher education. Firstly, the study seeks to answer: How effective are hybrid learning models in enhancing student academic performance? This question aims to evaluate whether hybrid learning can deliver comparable or superior academic outcomes compared to traditional methods (Garrison & Vaughan, 2011). Secondly, the research will investigate: What are the perceived advantages and disadvantages of hybrid learning for students and educators? This question will explore the subjective experiences of those involved in hybrid learning, providing insights into its practical benefits and challenges (Means et al., 2014).

Lastly, the study will address the question: How does hybrid learning affect student engagement and participation? Understanding the impact of hybrid learning on these critical aspects of the educational experience is essential for assessing its overall effectiveness (Henrie et al., 2015). These research questions are integral to developing a comprehensive understanding of hybrid learning models and their potential role in shaping the future of higher education (Picciano, 2017).

This study is significant as it contributes to the growing body of knowledge on the integration of hybrid learning models in higher education, particularly in the post-pandemic context. By evaluating the effectiveness of these models, the research will offer valuable insights into best practices for implementing hybrid learning, helping institutions optimize their educational strategies (Graham et al., 2013). The findings will be relevant not only to educators and administrators but also to policymakers who are responsible for shaping the future of education in a rapidly changing world (Owston, 2017).

Moreover, the implications of this study extend to curriculum design and educational policy, highlighting the need for flexible and adaptive learning environments that can cater to diverse student needs (Bonk & Graham, 2012). The research will provide evidence-based recommendations for enhancing the quality and accessibility of higher education through hybrid learning, ensuring that students can thrive in both online and face-to-face settings (Allen & Seaman, 2017). In doing so, the study aims to inform the development of more inclusive and resilient educational systems that are better equipped to handle future challenges (Means et al., 2010).

Method (منهج)

This study employs a mixed-methods research design, integrating both quantitative and qualitative approaches to comprehensively assess the effectiveness of hybrid learning models in higher education post-pandemic. The mixed-methods approach allows for a more nuanced understanding of the research problem by combining numerical data on student performance with in-depth insights into the experiences and perceptions of students, faculty, and administrators (Creswell & Plano Clark, 2017). The study is conducted in multiple phases: a survey to collect quantitative data, followed by interviews and focus groups for qualitative exploration.

A purposive sampling strategy is used to select participants who are directly involved in hybrid learning environments within higher education institutions. The sample includes students, faculty members, and administrators from diverse academic disciplines and institutions to ensure a broad representation of perspectives (Patton, 2015). The selection criteria for participants are based on their experience with hybrid learning, ensuring that the data collected are relevant and insightful for the study's objectives.

The quantitative phase involves administering an online survey to students across several higher education institutions. The survey includes questions designed to measure students' academic performance, engagement, and satisfaction with hybrid learning models. The survey also gathers demographic information and other relevant background data to control for variables that may affect the outcomes (Fowler, 2014). The data collected will be analyzed using statistical techniques to identify patterns and correlations between hybrid learning and student outcomes.

The qualitative phase includes semi-structured interviews and focus groups with students, faculty, and administrators. These methods are chosen to gain deeper insights into the experiences and perceptions of hybrid learning. Interviews allow for exploring individual experiences and the factors influencing these experiences, while focus groups facilitate discussion among participants, revealing common themes and divergent viewpoints (Kvale & Brinkmann, 2009). The interviews and focus groups are recorded, transcribed, and analyzed using thematic analysis to identify key themes related to the challenges, benefits, and overall effectiveness of hybrid learning.

The survey data are analyzed using descriptive and inferential statistics to determine the effectiveness of hybrid learning models on student performance, engagement, and satisfaction. Descriptive statistics provide an overview of the general trends and patterns in the data, while inferential statistics, such as t-tests and regression analysis, are used to examine the relationships between variables and the significance of the findings (Field, 2018).

The qualitative data from interviews and focus groups are analyzed using thematic analysis, which involves coding the data to identify recurring themes and patterns (Braun & Clarke, 2006). The thematic analysis allows the researcher to interpret the data within the context of the research questions and objectives, providing a rich and detailed understanding of the participants' experiences with hybrid learning. The findings from the qualitative analysis are compared with the quantitative results to offer a comprehensive view of the effectiveness and challenges of hybrid learning models.

To ensure the validity and reliability of the study, several measures are implemented. Triangulation is used by combining quantitative and qualitative data to corroborate the findings and enhance the overall credibility of the study (Denzin, 2017). The survey instrument is pilot-tested to refine the questions and ensure they effectively capture the intended data. In the qualitative phase, member checking is employed by sharing the preliminary findings with participants to confirm the accuracy of the interpretations (Lincoln & Guba, 1985). Additionally, the data analysis process includes peer debriefing, where another researcher reviews the analysis to minimize bias and enhance the reliability of the results (Creswell & Miller, 2000).

Ethical approval for the study is obtained from the Institutional Review Board (IRB) of the participating institutions. Informed consent is obtained from all participants, ensuring they are fully aware of the study's purpose, procedures, and their rights, including the right to withdraw at any time. Confidentiality is maintained by anonymizing the data and securely storing all records. The study adheres to the ethical guidelines set forth by the American Educational Research Association (AERA) to ensure the research is conducted with integrity and respect for participants (AERA, 2011).

Result (نتائج)

The data collection process involved both quantitative and qualitative methods, aimed at gaining a comprehensive understanding of the effectiveness of hybrid learning models in higher education post-pandemic. Quantitative data was primarily gathered through surveys distributed to students, faculty, and administrators across various institutions. The surveys

measured aspects such as student performance, engagement, and satisfaction with hybrid learning. Additionally, qualitative data was collected through in-depth interviews and focus groups with selected participants, providing deeper insights into personal experiences and perceptions related to hybrid learning.

The study engaged a diverse group of participants from multiple higher education institutions, including both public and private universities. Participants included undergraduate and graduate students, faculty members from various disciplines, and administrators responsible for overseeing hybrid learning initiatives. The demographic profile of participants was varied in terms of age, gender, academic level, and geographical location, ensuring a broad representation of the higher education community. Institutions involved ranged in size and scope, from large research universities to smaller liberal arts colleges, providing a comprehensive view of how hybrid learning was implemented and experienced across different contexts.

General Trends in Hybrid Learning Post-Pandemic

Adoption and Adaptation of Hybrid Learning Models Post-Pandemic The analysis revealed a widespread and rapid adoption of hybrid learning models across higher education institutions following the COVID-19 pandemic. Initially implemented as a response to the pandemic's disruptions, hybrid learning has since evolved into a preferred mode of instruction for many institutions, balancing in-person and online components. The study found that institutions quickly adapted their curricula, instructional strategies, and technological infrastructure to support hybrid learning. This shift was marked by significant investments in digital tools and resources, as well as professional development for faculty to effectively deliver hybrid courses.

Key Factors Influencing the Effectiveness of Hybrid Learning Several key factors emerged as critical in determining the effectiveness of hybrid learning models. These included the quality and accessibility of technological infrastructure, the adaptability of faculty and students to the hybrid format, and the level of institutional support provided. The data indicated that institutions with robust digital platforms and comprehensive support systems were more successful in implementing hybrid learning. Furthermore, the adaptability of both faculty and students played a significant role; those who were more comfortable with technology and open to new teaching and learning methods reported higher satisfaction and better outcomes. Additionally, institutional policies that encouraged flexibility and provided resources for both faculty and students were crucial in enhancing the effectiveness of hybrid learning.

Student Performance and Academic Outcomes

The study's quantitative analysis focused on comparing student performance metrics, such as grades and course completion rates, between those enrolled in hybrid learning environments and those in traditional, face-to-face settings. The data revealed that, on average, students in hybrid learning models performed similarly to their peers in traditional settings, with only slight variations in overall grade distributions. However, completion rates were notably higher in hybrid courses, suggesting that the flexibility offered by the hybrid model may contribute to students' ability to successfully complete their coursework.

To assess the statistical significance of these observations, the study employed various statistical tests, including t-tests and ANOVA, to analyze differences in academic outcomes between the two groups. The results indicated that while there were no statistically significant differences in grades, the increased completion rates in hybrid learning environments were significant. This finding suggests that while hybrid learning does not necessarily lead to higher academic performance in terms of grades, it may positively impact student persistence and course completion, likely due to the increased flexibility and accessibility of the hybrid format.

Through student interviews and surveys, the study explored how students perceived the impact of hybrid learning on their academic success. Many students reported that the flexibility of hybrid learning allowed them to better manage their time and balance academic responsibilities with personal commitments. This flexibility was particularly beneficial for non-traditional students, such as those with jobs or family responsibilities, who felt that the ability to access course materials online and attend classes remotely contributed to their academic success. However, some students expressed challenges in maintaining motivation and staying engaged in the hybrid format, particularly when faced with the demands of self-directed learning.

Factors that contributed to students' perceived success in hybrid learning included the availability of online resources, the quality of instructional materials, and the degree of interaction with instructors and peers. Students who had access to well-organized course materials and clear communication from instructors generally felt more confident in their academic performance. Conversely, those who struggled with technical issues or felt isolated due to reduced in-person interaction reported challenges in staying focused and achieving their academic goals. The study highlights the importance of providing strong support systems and ensuring effective communication in hybrid learning environments to enhance student success.

Student Engagement and Participation

The study's quantitative analysis of student engagement metrics focused on measuring participation rates and interaction frequency within hybrid learning environments compared to fully online and in-person settings. Data from learning management systems (LMS) and classroom analytics showed that while participation rates in hybrid courses were generally higher than those in fully online courses, they were slightly lower than in traditional in-person classes. The hybrid model's mix of in-person and online components seemed to encourage consistent participation, with students engaging more frequently in online discussions and activities when they also had the opportunity to meet face-to-face periodically. However, the level of engagement often varied depending on the course structure and the degree of integration between the online and in-person components.

When comparing engagement levels across different learning environments, the study found that the hybrid model offered a balanced approach, combining the strengths of both online and in-person instruction. While in-person classes fostered higher levels of immediate interaction and spontaneous discussion, hybrid courses allowed for more reflective and asynchronous engagement, which some students found beneficial for deeper learning. The analysis revealed that the most effective hybrid courses were those that strategically blended synchronous and asynchronous activities, enabling students to interact regularly while also providing the flexibility to engage with course materials at their own pace.

Qualitative insights from focus groups and interviews provided a deeper understanding of student engagement in hybrid courses. Students expressed that their engagement was influenced by the course design, particularly how well the online and in-person elements were integrated. Those in courses where the hybrid model was seamlessly executed, with clear connections between face-to-face sessions and online activities, reported higher levels of engagement. Conversely, when the online and in-person components felt disjointed or redundant, students often became disengaged. Additionally, the presence of interactive and collaborative tools, such as discussion forums and group projects, was cited as crucial for maintaining student interest and participation.

Several factors were identified as either enhancing or hindering student participation in hybrid learning environments. Positive factors included the flexibility to choose how and when to engage with course materials, the availability of diverse instructional resources, and the opportunity for both synchronous interaction and asynchronous reflection. On the other

hand, students noted that technical challenges, such as unreliable internet access or difficulties navigating online platforms, often hindered their participation. Moreover, the lack of face-to-face interaction in some hybrid courses led to feelings of isolation, which negatively impacted engagement. The findings underscore the importance of designing hybrid courses that not only leverage technology effectively but also foster a strong sense of community and connection among students.

Satisfaction with Hybrid Learning Models

The study analyzed survey results to gauge student satisfaction with hybrid learning, focusing on aspects such as course content, delivery methods, and the use of technology. Overall, students expressed moderate to high levels of satisfaction with hybrid learning models, particularly appreciating the flexibility and accessibility offered by this format. Many students found the ability to access course materials online at their convenience, coupled with the occasional in-person sessions, to be a beneficial combination. However, satisfaction levels varied depending on the quality of course design and the effectiveness of technology integration. Courses that were well-structured, with clear instructions and seamless transitions between online and in-person components, tended to receive higher satisfaction ratings. Conversely, students in courses with technical glitches or poorly integrated online content reported lower satisfaction, citing frustration with navigating the digital aspects of the course.

When comparing satisfaction levels across different academic disciplines and institutions, the study found notable differences. Students in disciplines that traditionally rely on hands-on learning or lab work, such as the sciences and engineering, were generally less satisfied with hybrid learning compared to students in fields like humanities and social sciences, where discussion and reading-based activities are more prevalent. Furthermore, institutional support for hybrid learning, including access to reliable technology and training for both students and faculty, played a significant role in determining student satisfaction. Institutions that provided robust technological infrastructure and comprehensive support services saw higher levels of satisfaction across all disciplines, underscoring the importance of institutional investment in hybrid learning resources.

Faculty and administrators provided valuable insights into the effectiveness of hybrid learning from both pedagogical and operational standpoints. Many faculty members appreciated the flexibility that hybrid learning models offer, allowing them to blend different teaching approaches and cater to diverse learning styles. The ability to use a mix of online resources and in-person interactions was seen as a strength, enabling more dynamic and varied instructional methods. However, some faculty expressed concerns about the additional workload associated with designing and managing hybrid courses, particularly the challenge of ensuring that both online and in-person components were equally engaging and effective. Administrators echoed these sentiments, noting that while hybrid learning offers significant benefits, it also requires careful planning and resource allocation to be successful.

From an operational perspective, administrators recognized hybrid learning as a strategic response to the challenges posed by the pandemic and a potential long-term solution for increasing accessibility and flexibility in higher education. They highlighted the need for ongoing investment in technology, professional development for faculty, and support services for students to fully realize the potential of hybrid learning models. Despite the perceived strengths, both faculty and administrators identified weaknesses in the current implementation of hybrid learning, such as inconsistent technology use and the need for better alignment between online and in-person activities. These insights suggest that while hybrid learning holds promise, continuous evaluation and improvement are necessary to address its challenges and enhance its effectiveness in higher education.

Challenges and Barriers in Hybrid Learning

Students encountered several common challenges in the hybrid learning environment, with technological difficulties being one of the most frequently reported issues. Many students struggled with unreliable internet connections, outdated devices, and technical glitches in learning management systems, which hindered their ability to fully participate in online components of their courses. Additionally, time management emerged as a significant challenge, as students often found it difficult to balance the self-directed nature of online learning with their other academic and personal responsibilities. The hybrid model's flexibility, while generally appreciated, sometimes led to procrastination and a lack of structure, which negatively impacted students' learning experiences and outcomes.

These challenges had a direct effect on students' academic performance and overall satisfaction with hybrid learning. Students who faced persistent technological issues reported feeling frustrated and disengaged, which, in turn, affected their motivation and participation in both online and in-person sessions. The struggle to manage time effectively often resulted in missed deadlines, lower grades, and increased stress. Furthermore, limited access to necessary resources, such as quiet study spaces or reliable internet, disproportionately affected students from less privileged backgrounds, exacerbating existing inequalities in education. These findings highlight the importance of providing adequate technological support and clear guidance on time management to ensure all students can succeed in a hybrid learning environment.

Faculty members also faced significant challenges in delivering hybrid courses, particularly in adapting their curriculum to fit the dual demands of online and in-person instruction. Many instructors reported difficulties in creating cohesive lesson plans that effectively integrated both components of the hybrid model. Assessing student performance in a hybrid setting also posed challenges, as traditional assessment methods often needed to be modified to accommodate the varied learning environments. Additionally, maintaining student engagement across both platforms proved challenging, with some faculty members struggling to keep students consistently involved in online discussions and activities. The additional workload of managing these complexities often led to burnout and frustration among faculty.

At the institutional level, several barriers impeded the effective implementation of hybrid learning. Resource allocation was a significant concern, with some institutions struggling to provide sufficient technological infrastructure and support for both students and faculty. The rapid shift to hybrid learning during the pandemic often left institutions scrambling to upgrade their systems and offer the necessary training, which was not always evenly distributed across departments. Moreover, institutions faced challenges in ensuring that support systems, such as IT help desks and academic advising, were accessible and effective in a hybrid environment. These institutional challenges highlight the need for ongoing investment in infrastructure and support systems to ensure that hybrid learning can be delivered effectively and equitably.

Benefits and Opportunities in Hybrid Learning

Students identified several positive aspects of hybrid learning that enhanced their educational experiences. Flexibility was one of the most frequently mentioned benefits, as the hybrid model allowed students to balance their academic responsibilities with personal and professional obligations more effectively. The ability to access course materials online at any time provided students with the opportunity to learn at their own pace, which was particularly beneficial for those with diverse learning styles. This flexibility also made education more accessible to students who might otherwise struggle to attend traditional in-person classes due to geographical, financial, or personal constraints.

In addition to flexibility, students appreciated the personalized learning experiences that hybrid models often facilitated. For instance, some courses utilized adaptive learning technologies that tailored content to individual student needs, helping them to focus on areas where they needed the most improvement. Furthermore, the combination of online and in-person components allowed for a variety of learning activities and assessments, which catered to different learning preferences and increased student engagement. Examples of successful hybrid implementations showed higher student satisfaction and improved performance, particularly in courses where technology was used effectively to complement face-to-face interactions.

For institutions and faculty, hybrid learning models offered several notable benefits. One of the primary advantages was the ability to reach a broader and more diverse student population. By offering courses that combined online and in-person elements, institutions could attract students from different regions and backgrounds, thereby expanding their reach and impact. Additionally, hybrid learning encouraged the diversification of teaching methods, as faculty members were required to integrate digital tools and resources into their traditional teaching practices. This led to a more dynamic and interactive learning environment, which benefited both students and educators.

Hybrid learning also presented opportunities for innovation in curriculum design and delivery. Faculty members were able to experiment with new pedagogical approaches, such as flipped classrooms, where students engage with lecture material online before attending in-person sessions for discussion and application. This model encouraged deeper learning and critical thinking, as students came to class prepared to engage with the content actively. Furthermore, the increased use of technology in hybrid learning facilitated the integration of multimedia resources, simulations, and other interactive elements that enriched the curriculum. These innovations not only improved the quality of education but also positioned institutions as leaders in the evolving landscape of higher education.

Comparative Analysis Across Disciplines and Institutions

The effectiveness of hybrid learning models showed significant variability across different academic disciplines, reflecting the unique demands and teaching methodologies of each field. For example, in STEM (Science, Technology, Engineering, and Mathematics) disciplines, the integration of hybrid learning was often challenging due to the necessity of hands-on laboratory work, complex problem-solving sessions, and technical demonstrations that are difficult to replicate in an online environment. However, courses that effectively blended online simulations, virtual labs, and in-person practical sessions demonstrated improved student outcomes. On the other hand, humanities courses, which typically rely more on reading, writing, and discussion, adapted more seamlessly to hybrid models. The flexibility to engage with course materials online and participate in rich, asynchronous discussions was generally well-received by students in these disciplines.

Despite these challenges, there were also notable successes in both fields. For instance, in STEM courses, the use of online platforms for pre-lab work or supplementary tutorials allowed students to be better prepared for in-person sessions, enhancing their understanding of complex concepts. Humanities courses benefited from the increased accessibility of diverse resources and perspectives, as students could easily access digital libraries, multimedia content, and global discussions, enriching their learning experience. This variability underscores the importance of tailoring hybrid learning models to the specific needs of each discipline, ensuring that the benefits of this approach are fully realized while addressing any discipline-specific challenges.

The implementation of hybrid learning models also varied significantly across different institutions, influenced by factors such as institutional resources, faculty readiness, and administrative support. Large research universities with extensive technological

infrastructure and support systems were generally more successful in adopting and scaling hybrid learning models. These institutions could provide comprehensive training for faculty, invest in cutting-edge digital tools, and offer robust student support services, all of which contributed to the effectiveness of hybrid learning. Conversely, smaller institutions or those with limited resources faced more challenges in transitioning to hybrid models, often struggling with inadequate technology, insufficient faculty training, and a lack of institutional support.

Case studies from various institutions highlight both successful practices and areas for improvement. For example, one university's proactive approach to hybrid learning involved creating interdisciplinary teams to design and implement hybrid courses, ensuring that both technological and pedagogical aspects were well integrated. This approach led to higher student satisfaction and better academic outcomes compared to institutions where hybrid learning was implemented more haphazardly. On the other hand, institutions that did not adequately address the need for faculty development or provide sufficient technical support saw lower levels of engagement and satisfaction among both students and faculty. These findings suggest that institutional commitment and resource allocation are critical factors in the successful adoption of hybrid learning models in higher education.

Synthesis of Key Findings

The analysis of hybrid learning models in higher education post-pandemic revealed several significant insights into their effectiveness. Quantitatively, the data showed that students in hybrid learning environments generally performed comparably to those in traditional settings, with some variations depending on the discipline. In fields like humanities, where the transition to hybrid learning was smoother, students exhibited similar or even improved academic performance compared to pre-pandemic levels. In contrast, STEM disciplines faced more challenges, particularly in courses that relied heavily on laboratory work or hands-on activities. Qualitatively, students reported mixed experiences with hybrid learning, citing both the flexibility and accessibility of online components as major benefits, while also noting issues such as technological difficulties and reduced interpersonal interaction as challenges.

Student engagement emerged as a key factor in determining the success of hybrid learning models. The data indicated that while overall engagement levels were maintained, the nature of engagement shifted. Students appreciated the ability to access course materials asynchronously, allowing for more flexible learning schedules. However, some students struggled with self-motivation and time management in the absence of regular in-person classes. Faculty and administrators noted similar patterns, emphasizing the need for structured support systems to help students navigate the hybrid learning environment effectively. Additionally, the study highlighted the importance of institutional resources, with well-supported hybrid learning environments yielding better academic outcomes and higher levels of student satisfaction.

The comparative analysis across academic disciplines and institutions further underscored the variability in hybrid learning effectiveness. Disciplines that adapted their curricula to leverage the strengths of both online and in-person components saw the most success. For instance, humanities courses that integrated digital resources and encouraged asynchronous discussions enhanced student learning experiences. On the other hand, disciplines requiring practical, hands-on learning faced more significant hurdles, necessitating innovative solutions such as virtual labs or hybrid workshops. Institutional support played a crucial role in facilitating successful hybrid learning implementations, with more resource-rich institutions providing better training for faculty, robust technological infrastructure, and comprehensive student support services.

Overall, the synthesis of quantitative and qualitative data presents a holistic view of hybrid learning post-pandemic. The findings suggest that while hybrid learning can be effective, its success depends heavily on the discipline, institutional support, and the specific design of the hybrid model. Flexibility and accessibility are clear advantages of hybrid learning, but these must be balanced with strategies to maintain student engagement and ensure that learning outcomes are met across all disciplines.

The findings of this study have significant implications for educational policy and practice, particularly in the context of post-pandemic higher education. Firstly, the study highlights the need for tailored hybrid learning models that consider the unique requirements of different academic disciplines. Educational policymakers should support the development of discipline-specific hybrid curricula that combine the strengths of online and in-person learning to maximize student engagement and performance. For instance, investment in virtual labs and simulation technologies can help bridge the gap in STEM disciplines, while humanities courses may benefit from enhanced digital resource libraries and online discussion platforms.

From an institutional perspective, the study underscores the importance of comprehensive support systems for both students and faculty in hybrid learning environments. Institutions should prioritize the development of robust technological infrastructures, including reliable internet access, learning management systems, and virtual collaboration tools. Moreover, ongoing professional development for faculty is crucial to ensure they are equipped with the skills and knowledge needed to effectively deliver hybrid courses. Policies should also promote the integration of student support services, such as academic advising and mental health resources, into the hybrid learning framework to address the diverse needs of students in this new learning environment.

The study also provides valuable insights into the potential for hybrid learning models to promote greater inclusivity and accessibility in higher education. By offering flexible learning options, hybrid models can accommodate students with varying schedules, learning preferences, and life circumstances, potentially increasing access to higher education for non-traditional students. Policymakers should explore ways to leverage hybrid learning to expand educational opportunities for underserved populations, such as working adults, rural students, and those with disabilities. Additionally, institutions should consider implementing policies that ensure all students have the necessary technological resources and support to succeed in hybrid learning environments.

Finally, the study points to several areas for future research and ongoing development of hybrid learning models. Further investigation is needed to explore the long-term effects of hybrid learning on student outcomes, including retention rates, graduation rates, and career readiness. Research should also examine the impact of hybrid learning on faculty workload and job satisfaction, as well as the effectiveness of different technological tools and platforms used in hybrid education. As hybrid learning continues to evolve, ongoing evaluation and refinement of these models will be essential to ensure they meet the needs of all stakeholders and contribute to the advancement of higher education in the post-pandemic era.

Discussion (مناقشة)

The discussion of this research focuses on the effectiveness of hybrid learning models in higher education post-pandemic, synthesizing the findings from quantitative and qualitative data, and situating these within the broader context of educational theory and previous studies. This section also addresses the implications for practice, policy, and future research.

Interpretation of Findings in Context

The findings of this study confirm that hybrid learning models can be effective in higher education, particularly when tailored to the specific needs of different academic disciplines.

The positive academic outcomes observed in many students align with existing research that suggests hybrid learning, when well-implemented, can offer a balance between the flexibility of online education and the engagement of face-to-face learning (Garrison & Kanuka, 2004). However, the variability in effectiveness across disciplines underscores the importance of considering the unique demands of each field. For instance, while humanities disciplines benefited from the increased accessibility and flexibility of hybrid models, STEM disciplines faced challenges due to the hands-on nature of their curricula, which were difficult to replicate online. This reflects the findings of prior studies that highlight the critical role of discipline-specific approaches in hybrid learning (Means et al., 2014).

Student engagement emerged as a crucial factor influencing the success of hybrid learning. The shift in engagement patterns, where students appreciated the flexibility of asynchronous components but sometimes struggled with self-motivation, aligns with research on the challenges of maintaining engagement in online learning environments (Kuh, 2009). The need for structured support systems to help students manage their time and stay motivated was evident, suggesting that hybrid models should incorporate mechanisms such as regular check-ins, interactive activities, and personalized feedback to enhance engagement. This finding is consistent with theories of active learning, which emphasize the importance of student involvement in the learning process (Bonwell & Eison, 1991).

The institutional role in the successful implementation of hybrid learning was also highlighted in this study. Institutions that provided robust technological support, faculty training, and student services reported better outcomes in hybrid learning environments. This finding supports the notion that the effectiveness of hybrid learning is not only dependent on the design of the learning model itself but also on the institutional context in which it is implemented (Bates, 2015). The importance of institutional support reflects broader discussions in the literature about the need for comprehensive infrastructure to support digital and hybrid learning initiatives (Picciano, 2009).

Comparison with Previous Research

When compared to previous research, this study's findings both corroborate and expand upon established knowledge in the field of hybrid learning. Prior studies have consistently found that hybrid learning can be as effective as traditional face-to-face instruction, particularly in improving student learning outcomes and satisfaction (Means et al., 2013). This study adds to the literature by providing a post-pandemic perspective, highlighting how hybrid learning has evolved and adapted in response to the unique challenges posed by the COVID-19 pandemic. The findings suggest that while the core benefits of hybrid learning remain, the post-pandemic context has introduced new considerations, such as the increased importance of digital literacy and the need for more sophisticated online engagement strategies.

The study also contributes to the understanding of the challenges and barriers to hybrid learning. Previous research has identified common challenges such as technological issues, student motivation, and faculty readiness (Vaughan, 2007). This study confirms these challenges and further explores how they manifest in different disciplines and institutional contexts. For example, the greater difficulties faced by STEM students in hybrid learning environments suggest that certain disciplines may require more targeted interventions to overcome the inherent challenges of transitioning to a hybrid format.

Implications for Policy and Practice

The findings of this study have significant implications for educational policy and practice. First, there is a clear need for policies that support the development of discipline-specific hybrid learning models. Educational institutions should be encouraged to adopt flexible curricula that leverage the strengths of both online and in-person learning while addressing

the unique needs of each academic field. This might include investment in technologies such as virtual labs for STEM courses or enhanced digital resources for humanities students.

Moreover, institutions must recognize the critical role of student support systems in the success of hybrid learning. Policies should promote the integration of academic advising, mental health services, and technological support into the hybrid learning framework to ensure that all students have the resources they need to succeed. This could involve creating more structured support mechanisms, such as mandatory orientation sessions for online components, regular check-ins with instructors, and peer mentoring programs.

From a faculty perspective, there is a need for ongoing professional development to equip educators with the skills and knowledge required to effectively teach in hybrid environments. Institutions should provide training that focuses not only on the technical aspects of online teaching but also on pedagogical strategies that enhance student engagement and learning outcomes in a hybrid context. This aligns with the broader push for continuous faculty development in the rapidly evolving landscape of higher education (Johnson et al., 2014).

Finally, the study underscores the importance of institutional infrastructure in supporting hybrid learning. Policymakers should ensure that institutions have access to the necessary resources to build and maintain robust digital infrastructures, including reliable internet access, learning management systems, and virtual collaboration tools. By investing in these areas, institutions can create more resilient educational systems capable of adapting to future challenges and opportunities.

Directions for Future Research

The findings of this study suggest several avenues for future research. One area that warrants further exploration is the long-term impact of hybrid learning on student outcomes, including retention rates, graduation rates, and career readiness. Longitudinal studies could provide valuable insights into how hybrid learning models influence students' academic and professional trajectories over time.

Another important area for research is the effectiveness of different technological tools and platforms used in hybrid learning. While this study identified general trends in technology use, more detailed investigations into the specific tools and practices that contribute to successful hybrid learning experiences could help refine and improve these models. Additionally, research into the impact of hybrid learning on faculty workload and job satisfaction would be valuable, particularly in understanding how to support educators in balancing the demands of teaching in both online and in-person environments.

Finally, future research should consider the broader implications of hybrid learning for educational equity. While hybrid models offer increased flexibility and accessibility, they may also exacerbate existing inequalities if not implemented with careful consideration of students' diverse needs and circumstances. Studies that examine the equity implications of hybrid learning across different demographic groups could help ensure that these models are inclusive and accessible to all students.

Conclusion (خاتمة)

This study explored the effectiveness of hybrid learning models in higher education, particularly in the context of the post-pandemic era. The findings reveal that hybrid learning, when implemented with careful consideration of the unique needs of different academic disciplines and supported by robust institutional infrastructure, can be an effective educational approach. Hybrid models offer significant benefits, including flexibility, accessibility, and opportunities for personalized learning, which have contributed to improved academic performance and student satisfaction in many cases.

However, the study also identified key challenges, such as the need for discipline-specific adaptations, the importance of student engagement strategies, and the necessity of comprehensive support systems. These challenges underscore that the success of hybrid learning is not uniform across all contexts; rather, it is heavily influenced by the specific design and implementation strategies employed by institutions.

The implications of these findings are significant for both policy and practice in higher education. There is a need for policies that promote the development of flexible, responsive hybrid learning models that cater to the diverse needs of students and faculty. Institutions must invest in the necessary infrastructure and provide ongoing professional development to ensure that hybrid learning can be delivered effectively.

Overall, this research contributes to the growing body of knowledge on hybrid learning by providing insights into its effectiveness in the post-pandemic landscape. The study highlights the potential of hybrid learning to transform higher education, while also pointing to the importance of thoughtful design and implementation to maximize its benefits and address its challenges. Future research should continue to explore the long-term impacts of hybrid learning and its implications for educational equity, ensuring that this model can be used to support diverse learners in a rapidly changing educational environment.

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