East African Journal of Education and Social Sciences
EAJESS March–April 2024, Vol. 5, No. 2, pp. 70-79.
ISSN: 2714-2132 (Online), 2714-2183 (Print). Published by G-Card
DOI: https://doi.org/10.46606/eajess2024v05i02.0370.

Post-Pandemic Hybrid Learning Trends in Higher Education and its Implications in Students' Academic Performance

***Oscar Menrad Msamba**
ORCiD: https://orcid.org/0009-0000-3518-360X
Department of Applied Sciences and Social Studies, Arusha Technical College, Tanzania
Email: oscar.msamba@atc.ac.tz

Naisujaki Sephania Lyimo, PhD
ORCiD: https://orcid.org/0009-0004-5107-6854
Department of Applied Sciences and Social Studies, Arusha Technical College, Tanzania
Email: naisujaki.lyimo@atc.ac.tz

***Corresponding Author:** oscar.msamba@atc.ac.tz

Abstract: This study used a systematic literature review and a bibliometric analysis to establish publication trends, key researchers, collaborative networks, thematic focus and effective strategies associated with hybrid learning environments in higher education. The study concentrated on the SCOPUS database using terms related to hybrid and online learning, academic performance and COVID-19, covering records within a specific period, using the PRISMA guidelines. The study used the bibliometric analysis through VOSviewer, revealing patterns in collaborative relationships and thematic trends. The study established that academic interest in hybrid, blended, online and virtual learning increased from the year 2020 to the year 2024 rising from nine in 2020 to 57 in 2023. The co-authorship network analysis revealed a collaborative research community, showing the existence of interdisciplinary and inter-institutional partnerships in advancing research and developing comprehensive insights into educational outcomes in hybrid learning environments. Co-citation analysis identifies influential authors and distinct thematic clusters. The co-occurrence map highlighted interconnected themes related to mental health, strategic adoption of distance learning and students' satisfaction. The study recommends that researchers should prioritize ongoing research within hybrid, blended, online and virtual learning environments to respond to evolving educational landscapes and recommend research-based learning strategies. For effective and innovative knowledge sharing, there is a need for interdisciplinary and inter-institutional research collaboration through joint projects, conferences and publication platforms.

Keywords: Hybrid learning; higher education; systematic literature review; academic performance; online learning, traditional instruction.

How to cite: Msamba, O. M. and Lyimo, N. (2024). Post-Pandemic Hybrid Learning Trends in Higher Education and its Implications in Students' Academic Performance. East African Journal of Education and Social Sciences 5(2)70-79. **Doi:** https://doi.org/10.46606/eajess2024v05i02.0370.

Introduction

Following the COVID-19 pandemic, there has been a significant shift in higher education, with institutions forced to implement hybrid-learning (Imran et al., 2023). Hybrid learning environments, defined as educational settings that combine the best aspects of traditional in-person instruction and digital teaching, have been acknowledged as having the potential to improve learning outcomes. Studies (Almusaed, 2023; Mohamad Nazri & Mat Zaki, 2023; Raes et al., 2020a) indicates that hybrid learning improves accessibility and student engagement, which enables more individualized instruction. In order to improve students' comprehension and retention of course materials, hybrid models offer a multitude of digital resources and can be used to a

wide range of teaching and learning styles (Wang, 2023).

Despite these encouraging findings, there are still a number of important limits to the body of knowledge currently available on hybrid learning environments. The majority of research done to date has been context specific, concentrating on certain organizations, fields of study or geographical areas, which restricts the applicability of its conclusions. This context-specific focus is often due to differences in institutional resources, student demographics and technological infrastructure, which can vary significantly across different settings. As a result, the applicability of conclusions drawn from these studies is restricted. For instance, findings from a study conducted in a technologically advanced institution may not be fully applicable to institutions with limited technological resources. An alternative approach to address these limitations involves conducting more comprehensive, cross-institutional studies that encompass a variety of settings, including different geographical locations, types of institutions and disciplines. Such studies can provide a broader understanding of the effectiveness of hybrid learning environments and allow generalizable conclusions.

Additionally, a lot of the research took place in the immediate wake of the pandemic and was therefore reactive, so it might not have completely captured the sustainability and long-term effects of hybrid learning models. However, while hybrid learning was present before the COVID-19 pandemic, several studies (Graham, 2006) and Saadé et al. (2007) have examined its efficacy, highlighting the potential benefits of hybrid learning models, including increased flexibility and improved learning outcomes compared to traditional methods. These early studies provide a foundation for understanding hybrid learning, though they may not fully capture the post-pandemic context and its unique challenges.

Moreover, comprehensive, systematic reviews and bibliometric analyses that evaluate hybrid learning environments are rare. This study aimed to address this gap by systematically reviewing and analyzing the current literature on hybrid learning environments, particularly in the context of higher education post-pandemic. In this study, "post-pandemic" refers to the period following the widespread implementation of remote and hybrid learning models necessitated by the COVID-19 pandemic, focusing on the ongoing adaptations and developments in educational practices during this time.

Learning Modalities in Higher Education

This section discusses three primary learning modalities in higher education: traditional learning, online learning and hybrid learning. Each modality offers distinct characteristics, benefits and challenges, which are critical to understanding their implication on students' performance and overall educational outcomes.

Traditional Learning

Structured learning environment and face-to-face interaction characterize traditional learning. Charytanowicz (2023) demonstrates how traditional classrooms facilitate experiential learning by providing students with immediate feedback. This method involves direct communication between students and teachers, which facilitates a deeper understanding of complex concepts and the ability to resolve problems together. Hill and LoPalo (2024) emphasized the importance of structured assessment methods in traditional settings, noting how these methods help maintain high levels of students' engagement and academic integrity. The enhancement of academic rigor and students' achievement is contingent upon the critical role of personal instruction and organized evaluation techniques in conventional educational environments. These elements are fundamental in fostering a supportive and interactive learning atmosphere, which is essential for the academic success and personal growth of students. This foundation in traditional learning methods provides a benchmark against which hybrid learning environments can be measured.

Online Learning

In recent years, online learning has evolved from a supplemental educational tool to a primary mode of instruction. These developments emerged from global COVID-19 pandemic challenges. A study by Kedia and Mishra (2023) highlight various factors influencing the effectiveness of online learning among college students, emphasizing the importance of digital literacy, technological infrastructure and instructional design in enhancing learning outcomes. The study underscores how online platforms facilitate flexibility and accessibility, allowing students to engage with course materials at their own pace and from diverse geographical locations. Similarly, Sáiz-Manzanares

et al., (2022) explored students' satisfaction with online teaching during the COVID-19 pandemic, illustrating how virtual classrooms seek to meet educational needs amidst unprecedented disruptions. The shift to online learning not only necessitated rapid adaptation but also provided opportunities for innovative pedagogical approaches. Furthermore, Bolatov et al. (2021) discussed the positive impact of online learning on mental health among medical students, highlighting the potential benefits of remote education in alleviating stress and enhancing well-being. These studies collectively underscore the transformative role of online learning in higher education, offering insights into its effectiveness, adaptability and broader implications for effective learning and maximized engagement.

Hybrid Learning

Hybrid learning, defined as a revolutionary approach to higher education that combines aspects of in-person instruction with online resources, integrates virtual resources with face-to-face interactions to improve learning outcomes and effectively engage students. Ravat et al. (2021) argue that combining virtual resources with face-to-face interactions improves learning outcomes and effectively engages students. Alhazbi and Hasan (2021) argued that hybrid learning accommodates different learning styles. According to Sandrone et al. (2021), both face-to-face and virtual learning are effective in STEM education because they allow for the integration of practical, hands-on experiences with flexible, remote learning opportunities. By combining digital and conventional learning techniques, hybrid learning creates personalized and interactive learning environments that prepare students for success in the 21st century by offering flexibility, adaptability and a broad range of resources to support diverse learning preferences and needs.

Several studies have shown varied impacts of hybrid learning. For example, Johnson et al. (2020) reported experiences of US faculty and administrators in transitioning to hybrid and online learning during the early stages of the COVID-19 pandemic. They highlighted both the challenges and adaptations required to maintain educational continuity; these challenges included the rapid shift to emergency remote teaching, the need for faculty to learn new teaching methods and the necessity of modifying assignments and exams to suit the new delivery mode. Raes et al. (2020b) examined the hybrid virtual classroom's impact on students' engagement and learning outcomes. The study established that the use of interactive quizzes significantly enhanced students' engagement and performance. Gros and García-Peñalvo (2023) explored future trends in e-learning design strategies, emphasizing the transformative potential of hybrid learning in engaging digital natives through innovative technological affordances.

Garrison and Kanuka (2004) laid the groundwork for understanding the transformative potential of hybrid learning in higher education. Their seminal work emphasized the ability of hybrid learning to enhance the educational experience by effectively combining online and face-to-face instruction. Although slightly older, Garrison and Kanuka's seminal work remains relevant in the context of North American and Canadian higher education. Graham (2006) provided an overview of emerging practices and research in hybrid learning, noting its increasing adoption in North America and Europe due to its flexibility and effectiveness in accommodating diverse learning preferences. Miller et al. (2021) presented the instructional communication challenges and opportunities encountered in remote, HyFlex and BlendFlex courses during the COVID-19 pandemic. The study highlighted how hybrid-learning models demonstrated resilience and adaptability, enabling institutions to maintain educational continuity despite unprecedented disruptions.

Mhlanga and Moloi (2020) explored the digital transformation in South Africa during the COVID-19 pandemic. The study highlighted both the challenges faced and the accelerated adoption of the Fourth Industrial Revolution (4IR) technologies in education. Adedoyin and Soykan (2023) examined challenges and opportunities of online and hybrid learning during the pandemic across African countries. The study underscored the need to address the digital divide to ensure equitable access to education. Makoe and Shandu (2018) focused on the development of mobile apps to support hybrid learning, emphasizing the effectiveness of these apps in enhancing English vocabulary acquisition in open distance learning contexts. Czerniewicz and Brown (2013) discussed the interactions between online and offline practices, pointing out the significant role of hybrid learning in bridging digital "strangers" or those who are less familiar with digital technology in higher education. Ng'ambi et al. (2016) reviewed two decades of technology-

enhanced teaching and learning in South African higher education. The review period appears into four phases: phase I (1996–2000), phase II (2001–05), phase III (2006–10) and phase IV (2011–16). The study emphasized the critical role of hybrid learning in improving educational outcomes. These critical roles include increasing student engagement, enhancing learning flexibility and providing access to diverse learning resources.

The discussed studies illustrate the significant impact and potential of hybrid learning in higher education. Hybrid learning has demonstrated flexibility, adaptability and effectiveness in enhancing students' engagement and performance, accommodating diverse learning styles and integrating practical experiences with remote learning opportunities. Moving forward, the continuous exploration of hybrid learning strategies, interdisciplinary collaborations and addressing challenges such as the digital divide are crucial for optimizing educational outcomes.

Methodology

This study employed a systematic search strategy to identify relevant literature, focusing on the SCOPUS database. The search terms included hybrid learning, blended learning, online learning, virtual learning, students' performance, academic performance, educational outcomes, higher education, college, university, post-pandemic and COVID-19. The search spanned from the earliest records in the SCOPUS database until 2024, yielding 482 records.

The study used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). This design provides a structured approach to reporting systematic reviews and meta-analyses to ensure transparency and completeness (Moher et al., 2010). The selection criteria were refined to include articles published between 2020 and 2024, focusing on document type (Article), publication stage (Final), keyword (COVID-19), source type (Journal) and language (English), resulting in 174 records.

The study excluded articles with zero citations to ensure inclusion of only research acknowledged and validated by the academic community. This criterion helped to focus on studies that have had an impact on the field. After applying this filter, 138 records remained. The researchers then exported records into an Excel sheet for duplicate removal, screening and analysis. After removing duplicates and conducting a thorough review of abstracts for quality and relevance, the number of articles was further refined, leading to a final set of 81 records for detailed analysis. This screening process ensured that only the most pertinent and high-quality research articles were included in the study.

To complement the systematic review, the researchers conducted a bibliometric analysis using VOSviewer, a software tool designed for constructing and visualizing bibliometric networks. Bibliometrics maps are graphical representations that illustrate the relationships and patterns within a body of literature, including collaborative relationships, co-citation patterns and thematic trends. The analysis aimed to uncover these patterns and trends within the selected body of literature, providing insights into the research landscape, identifying key themes and influential works.

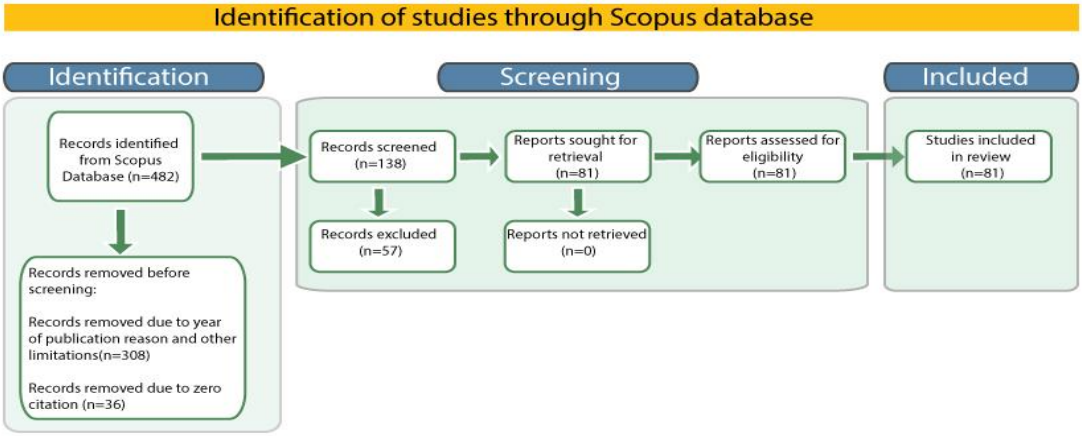

Figure 1: Articles Identification Process

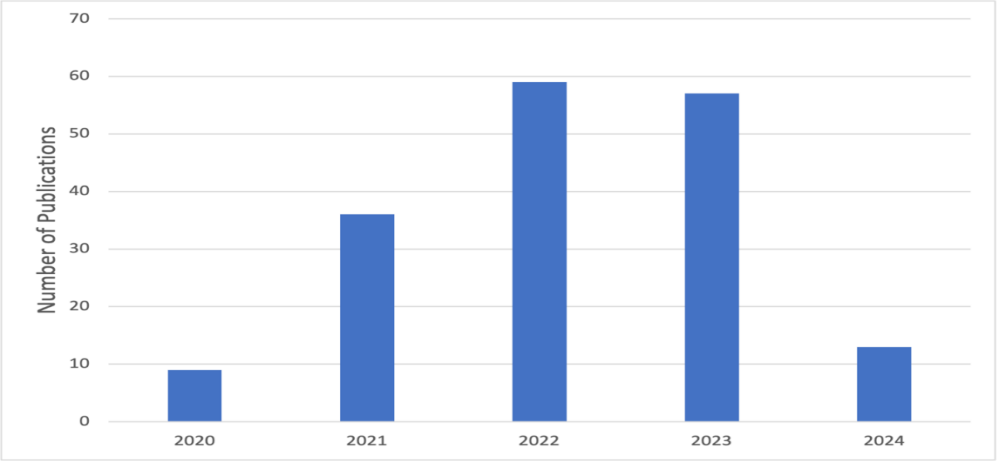

Figure 2. ("hybrid learning" OR "blended learning" OR "online learning" OR "virtual learning") AND ("student performance" OR "academic performance" OR "educational outcomes") AND ("higher education" OR "college" OR "university") AND ("post-pandemic" OR "COVID-19") from the Scopus database from the year 2020-2024 and other limitations.

Figure 1 illustrates the systematic procedure followed in the identification, screening and selection of articles. This figure is crucial as it provides a visual representation of the PRISMA flow, demonstrating the rigorous methodology employed to ensure the inclusion of high quality and relevant articles for the systematic review and bibliometric analysis.

Results and Discussion

This section presents the findings from the systematic review and bibliometric analysis, guided by the research questions designed to explore various dimensions of hybrid learning environments and their implications on students' performance in the higher education post-pandemic period. The analysis addresses the publication metrics, collaborative relationships among researchers, the intellectual structure of the field and the thematic trends within the selected literature. These results provide a comprehensive understanding of the current state of research and offer insights into the challenges, benefits and effective strategies associated with hybrid learning environments in higher education.

Research Question 1: How has academic interest in hybrid, blended, online and virtual learning related to student performance in higher education evolved post-COVID-19?

The search results shown in Figure 2 emerge from the Scopus Database. The query focused on hybrid, blended, online and virtual learning in relation to students' performance in higher education post-COVID-19. These results indicate a notable and increasing interest in this field of study from 2020 to 2024. The number of relevant research increased from nine publications in 2020 to 36 in 2021, and then rose to 59 articles in 2022 and 57 in 2023. This rise indicates the increased attention of the academic community towards comprehending the effects of different learning methods on student achievement in higher education, both during and after the epidemic. There has been an increase in the number of papers, which highlights the urgent requirement to investigate and improve hybrid, blended, online, and virtual learning environments in order to increase educational opportunity. This trend highlights the ongoing efforts by researchers and institutions to adapt to the evolving educational landscape and to develop effective strategies that support student success in the post-pandemic era.

Research Question 2: What does the co-authorship network reveal about collaborative relationships and their implication on research in hybrid, blended, online and virtual learning concerning student performance in higher education post-pandemic?

The co-authorship analysis depicted in the VOSviewer network visualization in Figure 3 illustrates the collaborative relationships among six studies in the field of hybrid, blended, online and virtual learning concerning students' performance (Chinna et al., 2021; Khoshaim et al., 2020; Kamaludin et al., 2020; Nurunnabi et al., 2020; Sundarasen et al., 2020 and Hossain et al., 2021). Kamaludin et al. (2020) appeared to be the central figure with the most connections. Khoshaim et al.

(2020) and Hossain et al. (2021) further show significant connectivity, suggesting strong collaborative ties within this research filed. The network's structure highlights multiple interconnections among the authors, showing a closely related research community with substantial collaborative efforts. The connections between these authors show a collaborative research environment where researchers share knowledge to advance the understanding of educational outcomes.

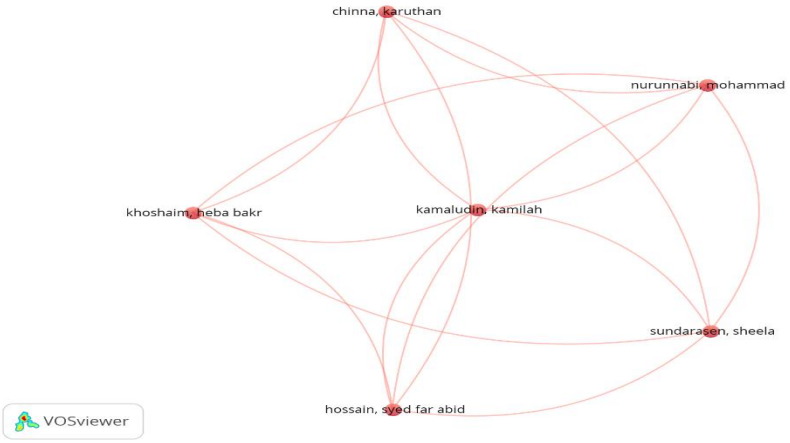

Figure 3: A bibliometric Map of Co-authorship

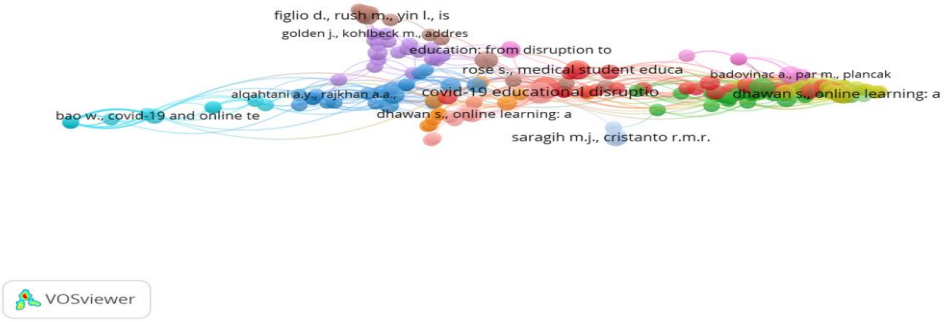

Figure 4: A bibliometric Map of Co-citation

Research Question 3: How do the clusters of co-cited authors reflect the evolving thematic areas and key contributions within this field?

The co-citation analysis visualization generated by VOSviewer in Figure 4 illustrates the intellectual structure of research related to COVID-19 and online education. This network map shows clusters of frequently co-cited authors, indicating thematic areas within this research field. Key authors identified includes Bao (2020), Dhawan (2020) and Rose (2020), suggesting that their work is highly influential in the discourse on the educational disruptions caused by the COVID-19 pandemic and the subsequent shift to online learning. The various clusters represent distinct sub-topics, including medical student education, general online learning strategies and the broader impact of COVID-19 on education. This clustering signifies that while these sub-topics are interconnected, they also maintain distinct areas of focus within the larger body of research. The presence of multiple interconnected clusters highlights a comprehensive and multifaceted scholarly conversation, encompassing

various dimensions of the educational challenges and innovations prompted by the pandemic.

Research Question 4: How do interconnected themes in term co-occurrence reveal the impact of hybrid and online learning on students' performance and well-being?

The term co-occurrence map generated by VOSviewer in Figure 5 highlights the interconnected research themes in the field of hybrid, blended, online and virtual learning in relation to students' performance in higher education during the post-COVID-19 period.

Prominent clusters include themes related to mental health and students' well-being (e.g. mental health, anxiety, and university students), strategic and procedural aspects of adopting distance learning, students' satisfaction and performance metrics. The map reveals significant attention to the psychological impact, the strategic integration of online learning and the measurement of educational outcomes.

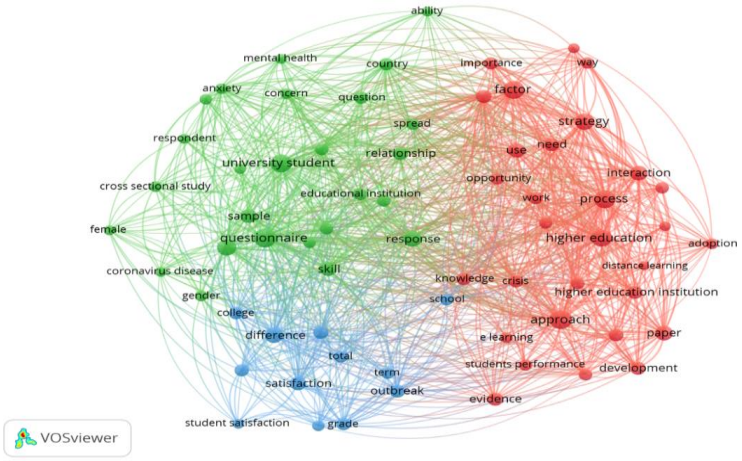

Figure 5: A bibliometric Map of Term Co-occurance

The interconnections among terms such as university students, educational institutions, skill and response show a comprehensive approach to understanding the multifaceted impact of the pandemic on higher education. This holistic perspective is essential for developing effective strategies and support systems to optimize students' performance and well-being in the evolving educational systems.

Conclusions and Recommendations

Conclusions

The study concludes that academic interest in hybrid, blended, online and virtual learning increased from the year 2020 to the year 2024 rising from nine in 2020 to 57 in 2023. This trend shows a growing recognition of the need to understand and optimize the educational approaches in response to challenges posed by the pandemic.

The co-authorship network analysis revealed a collaborative research community. This trend shows the existence of interdisciplinary and inter-institutional partnerships in advancing research and developing comprehensive insights into educational outcomes in hybrid learning environments.

Co-citation analysis identified influential authors, such as Bao (2020), Dhawan (2020) and Rose (2020) and distinct thematic clusters, such as medical student education, online learning strategies and broader impact of COVID-19. This trend indicates that the rich and diverse scholarly conversation characterizes the field. The comprehensive dialogue addresses various dimensions of educational challenges and innovations, highlighting the significant contributions of researchers in understanding the impact of the pandemic.

The co-occurrence map highlights interconnected themes related to mental health, strategic adoption of distance learning and students' satisfaction. This trend demonstrates a holistic approach to studying the impact of the pandemic.

Recommendations

Based on the conclusions, the study recommends that researchers should prioritize ongoing research within hybrid, blended, online and virtual learning

environments to respond to evolving educational landscapes and recommend research-based learning strategies. For effective and innovative knowledge sharing, there is a need for interdisciplinary and inter-institutional research collaboration through joint projects, conferences and publication platforms. Institutions should integrate mental health resources, strategic learning frameworks and performance measurement tools to create a balanced and supportive hybrid-learning environment. This approach ensures that both academic and psychological needs of students are met, promoting overall well-being and academic success.

References

Adedoyin, O. B., & Soykan, E. (2023). Covid-19 pandemic and online learning: the challenges and opportunities. Interactive Learning Environments, 31(2), 863–875. https://doi.org/10.1080/10494820.2020.1813180.

Alhazbi, S., & Hasan, M. A. (2021). The Role of Self-Regulation in Remote Emergency Learning: Comparing Synchronous and Asynchronous Online Learning. Sustainability, 13(19), 11070. https://doi.org/10.3390/su131911070.

Almusaed, A. A. A. R.-C. M. (2023). Maximizing Student Engagement in a Hybrid Learning Environment: A Comprehensive Review and Analysis. 428–444.

Bao, W. (2020). COVID-19 and online teaching in higher education: A case study of Peking University. Human Behavior and Emerging Technologies, 2(2), 113–115. https://doi.org/10.1002/hbe2.191.

Bolatov, A. K., Seisembekov, T. Z., Askarova, A. Zh., Baikanova, R. K., Smailova, D. S., & Fabbro, E. (2021). Online-Learning due to COVID-19 Improved Mental Health Among Medical Students. Medical Science Educator, 31(1), 183–192. https://doi.org/10.1007/s40670-020-01165-y.

Charytanowicz, M. (2023). Online Education vs Traditional Education: Analysis of Student Performance in Computer Science using Shapley Additive Explanations. Informatics in Education. https://doi.org/10.15388/infedu.2023.23.

Chinna, K., Sundarasen, S., Khoshaim, H. B., Kamaludin, K., Nurunnabi, M., Baloch, G. M., Hossain, S. F. A., Sukayt, A., Dalina, N., Rajagopalan, U., Kumar, R., & Memon, Z. (2021). Psychological impact of COVID-19 and lock down measures: An online cross-sectional multicounty study on Asian university students. PLOS ONE, 16(8), e0253059. https://doi.org/10.1371/journal.pone.0253059.

Czerniewicz, L., & Brown, C. (2013). The habitus of digital "strangers" in higher education. British Journal of Educational Technology, 44(1), 44–53. https://doi.org/10.1111/j.1467-8535.2012.01281.x.

Dhawan, S. (2020). Online Learning: A Panacea in the Time of COVID-19 Crisis. Journal of Educational Technology Systems, 49(1), 5–22. https://doi.org/10.1177/0047239520934018.

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. The Internet and Higher Education, 7(2), 95–105. https://doi.org/10.1016/j.iheduc.2004.02.001.

Graham, C. R. (2006). Blended learning systems. The handbook of blended learning. Global perspectives, local designs 1, 3–21.

Gros, B., & García-Peñalvo, F. J. (2023). Future Trends in the Design Strategies and Technological Affordances of E-learning. I Learning, Design, and Technology (s. 345–367). Springer International Publishing. https://doi.org/10.1007/978-3-319-17461-7_67.

Hill, A. J., & LoPalo, M. (2024). The effects of online vs in-class testing in moderate-stakes college environments. Economics of Education Review, 98, 102505. https://doi.org/10.1016/j.econedurev.2023.102505.

Hossain, S. F. A., Shan, X., Nurunnabi, M., Tushar, H., Mohsin, A. K. M., & Ahsan, F. T. (2021). Opportunities and Challenges of M-Learning During the COVID-19 Pandemic (s. 210–227). https://doi.org/10.4018/978-1-7998-7764-6.ch007.

Imran, R., Fatima, A., Elbayoumi Salem, I., & Allil, K. (2023). Teaching and learning delivery modes in higher education: Looking back to move forward post-COVID-19 era. The International Journal of Management Education, 21(2), 100805. https://doi.org/10.1016/j.ijme.2023.100805.

Johnson, N., Veletsianos, G., & Seaman, J. (2020). U.S. Faculty and Administrators' Experiences and Approaches in the Early Weeks of the COVID-19 Pandemic. Online Learning, 24(2). https://doi.org/10.24059/olj.v24i2.2285.

Kamaludin, K., Chinna, K., Sundarasen, S., Khoshaim, H. B., Nurunnabi, M., Baloch, G. M., Sukayt, A., &

Hossain, S. F. A. (2020). Coping with COVID-19 and movement control order (MCO): experiences of university students in Malaysia. Heliyon, 6(11), e05339. https://doi.org/10.1016/j.heliyon.2020.e05339.

Kedia, P., & Mishra, L. (2023). Exploring the factors influencing the effectiveness of online learning: A study on college students. Social Sciences & Humanities Open, 8(1), 100559. https://doi.org/10.1016/j.ssaho.2023.100559.

Khoshaim, H. B., Al-Sukayt, A., Chinna, K., Nurunnabi, M., Sundarasen, S., Kamaludin, K., Baloch, G. M., & Hossain, S. F. A. (2020). Anxiety Level of University Students During COVID-19 in Saudi Arabia. Frontiers in Psychiatry, 11. https://doi.org/10.3389/fpsyt.2020.579750.

Makoe, M., & Shandu, T. (2018). Developing a Mobile App for Learning English Vocabulary in an Open Distance Learning Context. The International Review of Research in Open and Distributed Learning, 19(4). https://doi.org/10.19173/irrodl.v19i4.3746.

Mhlanga, D., & Moloi, T. (2020). COVID-19 and the Digital Transformation of Education: What Are We Learning on 4IR in South Africa? Education Sciences, 10(7), 180. https://doi.org/10.3390/educsci10070180.

Miller, A. N., Sellnow, D. D., & Strawser, M. G. (2021). Pandemic pedagogy challenges and opportunities: instruction communication in remote, HyFlex , and BlendFlex courses. Communication Education, 70(2), 202–204. https://doi.org/10.1080/03634523.2020.1857418.

Mohamad Nazri, N. Z., & Mat Zaki, M. R. (2023). THE FLEXIBILITY IN A HYBRID LEARNING ENVIRONMENT AFTER COVID-19: A CONCEPT PAPER. International Journal of Education, Psychology and Counseling, 8(52), 143–149. https://doi.org/10.35631/IJEPC.852012.

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2010). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. International Journal of Surgery, 8(5), 336–341. https://doi.org/10.1016/j.ijsu.2010.02.007.

Ng'ambi, D., Brown, C., Bozalek, V., Gachago, D., & Wood, D. (2016). Technology enhanced teaching and learning in South African higher education – A rearview of a 20 year journey. British Journal of Educational Technology, 47(5), 843–858. https://doi.org/10.1111/bjet.12485.

Nurunnabi, M., Hossain, S. F. A. H., Chinna, K., Sundarasen, S., Khoshaim, H. B., Kamaludin, K., Baloch, G. M., Sukayt, A., & Shan, X. (2020). Coping strategies of students for anxiety during the COVID-19 pandemic in China: a cross-sectional study. F1000Research, 9, 1115. https://doi.org/10.12688/f1000research.25557.1

Raes, A., Vanneste, P., Pieters, M., Windey, I., Van Den Noortgate, W., & Depaepe, F. (2020a). Learning and instruction in the hybrid virtual classroom: An investigation of students' engagement and the effect of quizzes. Computers & Education, 143, 103682. https://doi.org/10.1016/j.compedu.2019.103682.

Raes, A., Vanneste, P., Pieters, M., Windey, I., Van Den Noortgate, W., & Depaepe, F. (2020b). Learning and instruction in the hybrid virtual classroom: An investigation of students' engagement and the effect of quizzes. Computers & Education, 143, 103682. https://doi.org/10.1016/j.compedu.2019.103682.

Ravat, S., Barnard-Ashton, P., & Keller, M. M. (2021). Blended teaching versus traditional teaching for undergraduate physiotherapy students at the University of the Witwatersrand. South African Journal of Physiotherapy, 77(1). https://doi.org/10.4102/sajp.v77i1.1544.

Rose, S. (2020). Medical Student Education in the Time of COVID-19. JAMA, 323(21), 2131. https://doi.org/10.1001/jama.2020.5227.

Sáiz-Manzanares, M.-C., Casanova, J., Lencastre, J.-A., Almeida, L., & Martín-Antón, L.-J. (2022). Student satisfaction with online teaching in times of COVID-19. Comunicar, 30(70), 35–45. https://doi.org/10.3916/C70-2022-03.

Sandrone, S., Scott, G., Anderson, W. J., & Musunuru, K. (2021). Active learning-based STEM education for in-person and online learning. Cell, 184(6), 1409–1414. https://doi.org/10.1016/j.cell.2021.01.045.

Saadé, R. G., He, X., & Kira, D. (2007). Exploring dimensions to online learning. Computers in Human Behavior, 23(4), 1721–1739. https://doi.org/10.1016/j.chb.2005.10.002.

Sundarasen, S., Chinna, K., Kamaludin, K., Nurunnabi, M., Baloch, G. M., Khoshaim, H. B.,

Hossain, S. F. A., & Sukayt, A. (2020). Psychological Impact of COVID-19 and Lockdown among University Students in Malaysia: Implications and Policy Recommendations. International Journal of Environmental Research and Public Health, 17(17), 6206. https://doi.org/10.3390/ijerph17176206.

Wang, R. (2023). Economic Benefits of Blended Teaching Mode in the Knowledge Economy Era: A Case Study of College English Course. Journal of the Knowledge Economy. https://doi.org/10.1007/s13132-023-01595-0.