# Hybrid Digital Learning: Enhancing Physical Education Student Achievement in Motor Learning Courses With Synchronous and Asynchronous Session

**Fajar Hidayatullah, Khoirul Anwar, Heni Yuli Handayani, Septyaningrum Putri Purwoto, Agus Himawan, Haryo Mukti Widodo**

**STKIP PGRI Bangkalan, Jalan Soekarno Hatta No.52 Bangkalan Madura, 69116, Indonesia**

e-mail: fajar@stkippgri-bkl.ac.id, khoirul@stkippgri-bkl.ac.id, heni@stkippgri-bkl.ac.id, septyaningrum@stkippgri-bkl.ac.id, agus@stkippgri-bkl.ac.id, haryomukti@stkippgri-bkl.ac.id

***Abstract:*** *Hybrid digital learning has gained prominence as an innovative approach to enhancing student achievement in motor learning courses within physical education (PE) programs. This study explores the effectiveness of combining synchronous and asynchronous learning sessions to improve students development and performance. In traditional PE courses, students often face challenges in mastering information gained due to the limitations of face-to-face instruction and the varying pace at which individuals learn. The hybrid model, which integrates real-time, instructor-led sessions with flexible, self-paced online learning modules, offers a more dynamic and personalized educational experience. Through synchronous sessions, students benefit from live interaction with instructors, enabling immediate feedback and the opportunity to engage in real-time discussions. Asynchronous sessions, on the other hand, provide students with the flexibility to review course materials, and complete assignments at their own pace, reinforcing learning outside the classroom. This dual approach accommodates different learning styles, encourages self-directed learning, and helps students develop cognitive of motor learning. The study examines the impact of this hybrid learning format on student achievement in motor learning courses, focusing on factors such as cognitive development and student engagement. The findings suggest that students who participated in the hybrid model showed significant improvements in motor skill performance and better retention of learned techniques compared to those in traditional, fully in-person courses. Additionally, the hybrid format promoted greater student self-regulation and allowed for individualized learning, making the course more inclusive and accessible. This research highlights the potential of hybrid digital learning to revolutionize motor learning in physical education, providing a flexible, effective, and engaging approach to developing motor skills and enhancing student outcomes in the digital age.*

***Keywords:*** hybrid learning, digital learning, higher education, synchronous, asynchronous

## INTRODUCTION

Hybrid learning, a pedagogical approach that integrates traditional face-to-face instruction with online learning, has gained significant traction. This model not only facilitates flexibility in learning but also enhances student engagement and motivation. The hybrid learning environment allows students to choose between in-person and online participation, thereby accommodating diverse learning preferences and circumstances (Rijst et al., 2023; Hadiati et al., 2023). One of the primary advantages of hybrid learning is its capacity to foster student engagement. Research indicates that students participating in hybrid learning environments often report higher levels of motivation and satisfaction compared to traditional learning settings (İnal et al., 2023; Palmer et al., 2022). This increased engagement can be attributed to the interactive nature of hybrid models, which often incorporate technology-enhanced learning tools that promote active participation (Ahlgren et al., 2020). Furthermore, the flexibility offered by hybrid learning allows students to manage their time more effectively, leading to improved academic performance and retention of knowledge (İnal et al., 2023; Palmer et al., 2022). Moreover, hybrid learning has been shown to support diverse learning styles and

needs. By combining various instructional methods, such as synchronous and asynchronous learning, educators can tailor their approaches to meet the unique requirements of their students (İnal et al., 2023;Palmer et al., 2022). This adaptability is particularly beneficial in inclusive education settings, where students may have varying levels of access to technology or different learning preferences (Kantcheva & Bickle, 2023).

Research indicates that the integration of digital technologies in education not only enhances teaching effectiveness but also fosters comprehensive student development and adaptability within educational systems (Althubyani, 2024). However, the transition to digital education has not been without challenges. Teachers have faced significant hurdles in adapting to new technologies, necessitating professional development and support to enhance their digital competencies (Aguirre et al., 2022; VanLeeuwen et al., 2020). Moreover, the effectiveness of digital education initiatives is influenced by various factors, including access to technology, infrastructure, and the pedagogical approaches employed (Melnyk et al., 2023). As institutions continue to navigate the complexities of digital transformation, it is crucial to adopt strategies that address these challenges while leveraging the benefits of digital education (Zhu et al., 2024; Cai & Chen, 2024). In conclusion, the ongoing digital transformation in higher education necessitates a concerted effort to enhance digital competencies among educators and to create supportive environments that facilitate effective teaching and learning. By addressing the challenges and capitalizing on the opportunities presented by digital education, institutions can better prepare both educators and students for success in a rapidly evolving digital landscape (Alenezi et al., 2023; Robertsone & Lapina, 2022; Ding & Wu, 2024).

Synchronous learning refers to real-time online interactions between instructors and students, allowing for immediate feedback and engagement. This mode of learning contrasts with asynchronous learning, where interactions occur at different times, often leading to delays in communication. Research has shown that synchronous learning can significantly enhance student engagement and satisfaction. For instance, Jeong & Chung (2023) found that students' satisfaction with online learning is heavily influenced by effective teaching strategies, which are more easily implemented in synchronous formats. Similarly, the study by Tarazi & Ortega-Martín (2023) highlighted that student engagement in synchronous classes is crucial for fostering a productive learning environment. Moreover, the impact of synchronous learning on academic performance has been a focal point of several studies. For instance, research by Oguguo et al (2021) demonstrated that students participating in synchronous learning achieved higher academic outcomes compared to their peers in asynchronous settings. This finding suggests that the immediacy and interactive nature of synchronous learning can lead to better comprehension and retention of course material. Additionally, the study by (Lu & Chen, 2011) indicated that synchronous learning environments promote active engagement, which is crucial for effective learning.

Asynchronous learning has emerged as a pivotal component of digital learning management systems (LMS) in higher education, particularly in the context of physical education. The transition to asynchronous learning has been significantly influenced by the rapid advancement of technology and the necessity for flexible learning environments. (Rozi et al., 2021) emphasize that mobile devices facilitate educational interactions by allowing educators to reach students at any time and place, thereby enhancing the learning experience. This flexibility is particularly beneficial in physical education, where practical engagement is essential. The asynchronous model enables students to access instructional materials, participate in discussions, and complete assignments at their convenience, which can lead to improved learning outcomes (Goyal, 2012). Despite the advantages of asynchronous learning, challenges remain. For instance, (Moustakas & Robrade, 2022) document the difficulties faced by students and educators in adapting to online learning modalities during the

pandemic. Their study reveals that while students appreciated the flexibility of asynchronous learning, they also encountered issues such as lack of motivation and difficulties in engaging with practical components of physical education. Furthermore, the integration of interactive e-learning systems has been proposed as a solution to enhance the effectiveness of asynchronous learning in physical education. (Ogla & Mohammed, 2016) discuss the implementation of an interactive e-learning system based on cloud computing, which provides immediate and interactive solutions for students, particularly those in remote areas. This approach not only addresses accessibility issues but also enriches the learning experience by incorporating interactive elements that can engage students more effectively.

The integration of synchronous and asynchronous learning modalities in digital learning management systems (LMS) has gained significant attention, particularly in the context of physical education within higher education. The effectiveness of blended learning approaches has been supported by various studies. For example, Kurniawati & Mardiningrum (2022) identified several strategies employed by students to navigate asynchronous learning, such as seeking additional resources and engaging in self-directed study. These strategies not only enhance learning outcomes but also foster independence and critical thinking skills, which are vital in physical education contexts where self-management is crucial for skill development. The role of technology in facilitating effective synchronous and asynchronous learning experiences cannot be overstated. The use of digital tools such as video conferencing platforms and learning management systems has transformed the educational landscape, allowing for innovative teaching methods that blend both modalities. For instance, Mariati et al (2022) emphasized the importance of utilizing technology to create engaging and interactive learning environments that support both synchronous and asynchronous activities. Moreover, the effectiveness of blended learning in enhancing student engagement and motivation has been well-documented. Northey et al (2015) reported that asynchronous learning can increase student engagement by allowing for more thoughtful participation in discussions, while synchronous sessions can foster a sense of community and belonging among students. In conclusion, the integration of synchronous and asynchronous learning modalities in digital learning management systems offers a promising approach to enhancing physical education in higher education. By leveraging the strengths of both modalities, educators can create more engaging, flexible, and inclusive learning environments that cater to diverse student needs. However, addressing the challenges associated with this integration, such as time management and access to technology, is essential for maximizing the benefits of blended learning.

**METHOD**

This study employs a pre-experimental design, specifically the pretest-posttest only design, to measure changes following the treatment, with measurements taken before (pretest) and after (posttest) the treatment on the same sample. The sample size for this study is 36 participants, consisting of 31 males and 5 females. The sampling technique used is purposive sampling, where samples are selected based on specific criteria relevant to the research objectives, ensuring that the results are more representative.

The treatment was administered through several stages:

1. Asynchronous material deliver: Students were provided with access to educational videos that they could watch independently. This material was designed to offer a foundational understanding of the topics covered and could be studied at each student's own pace.

2. Synchronous learning sessions: Real-time, instructor-led sessions (either in-person or virtually) were conducted, allowing instructors to provide deeper explanations of the material, answer questions, and give immediate feedback.
3. Daily learning achievement measurement: At the end of each session, students completed a quiz consisting of 5 questions related to the material studied. This quiz aimed to measure students' understanding and daily learning outcomes.
4. Independent assignments at home: Students were given homework assignments to reflect on the course material. These assignments helped students internalize and apply the concepts learned.

Each class meeting consistently incorporated all these modalities to ensure effective and comprehensive learning processes. To test data normality, the Kolmogorov-Smirnov test was used. This test aimed to determine whether the data distribution followed a normal distribution, which is essential for ensuring the assumptions in further statistical analyses are met. This test ensured that the variances between groups were homogeneous, a critical assumption for comparison tests. Finally, differences between pretest and posttest results were analyzed using a paired sample t-test. This test assessed whether there were significant differences between the two conditions measured on the same sample, before and after the treatment. The results of this test would indicate the effectiveness of the treatment applied in the study. With this methodology, the research aims to provide valid and reliable results regarding the impact of the treatment on the variables studied. This method also ensures that the statistical analysis conducted adheres to the necessary assumptions for accurate interpretation.

**RESULT**

**Table 1.** Normality Test Result

| | | PRETEST | POSTTEST |
|---|---|---|---|
| N | | 36 | 36 |
| Normal Parameters[a,b] | Mean | 35.33 | 43.28 |
| | Std. Deviation | 8.612 | 15.157 |
| Most Extreme Differences | Absolute | .105 | .103 |
| | Positive | .081 | .103 |
| | Negative | -.105 | -.079 |
| Test Statistic | | .105 | .103 |
| Asymp. Sig. (2-tailed) | | .200[c,d] | .200[c,d] |

The Kolmogorov-Smirnov normality test results for both pretest and posttest data indicate that the test statistics are 0.105 and 0.103, respectively, with Asymptotic Significance (2-tailed) values of 0.200 for both. Since these significance values are greater than 0.05, we conclude that both pretest and posttest data do not significantly deviate from a normal distribution. This confirms that the data for both pretest and posttest are normally distributed, meeting the assumption of normality necessary for conducting further parametric statistical analyses reliably and accurately.

**Table 2.** Paired Samples Statistic

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | PRETEST | 35.33 | 36 | 8.612 | 1.435 |
| | POSTTEST | 43.28 | 36 | 15.157 | 2.526 |

The paired samples statistics indicate that the mean score increased from 35.33 in the pretest to 43.28 in the posttest, based on 36 observations for each test. The standard deviation for the pretest is 8.612 with a standard error mean of 1.435, while the posttest has a higher standard deviation of 15.157 and a standard error mean of 2.526. This suggests that, overall, there was an improvement in scores after the treatment, although the variability in posttest scores is greater than in the pretest scores. This indicates a positive impact of the intervention on performance.

**Table 3.** Paired Samples Correlation

| | | N | Correlation | Sig. |
|---|---|---|---|---|
| Pair 1 | PRETEST & POSTTEST | 36 | .218 | .202 |

The paired samples correlation results indicate a correlation coefficient of 0.218 between the pretest and posttest scores, based on 36 observations. The significance value (Sig.) is 0.202, which is greater than 0.05. This means that there is no statistically significant correlation between the pretest and posttest scores. In other words, the changes in scores from pretest to posttest are not strongly correlated, suggesting that the pretest scores are not a strong predictor of the posttest scores. This might imply that other factors or the intervention itself had a significant impact on the posttest outcomes.

**Table 4.** Paired Samples Test

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 95% Confidence Interval of the Difference | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | | | |
| Pair 1 | PRETEST-POSTTEST | -7.944 | 15.719 | 2.620 | -13.263 | -2.626 | -3.032 | 35 | .005 |

The results of the paired samples test indicate a mean difference of -7.944 between pretest and posttest scores. The standard deviation of the differences is 15.719, and the standard error mean is 2.620. The 95% confidence interval for the difference ranges from -13.263 to -2.626. The t-value is -3.032 with 35 degrees of freedom, and the significance level (2-tailed) is 0.005. Since the significance value is less than 0.05, we can conclude that there is a statistically significant difference between the pretest and posttest scores. This suggests that the intervention or treatment applied had a significant impact on improving the performance of the participants. The negative mean difference indicates that the posttest scores were higher than the pretest scores, reflecting an improvement.

**DISCUSSION**

The findings from this study indicate a significant improvement in post-test scores compared to pre-test scores, suggesting that hybrid learning models can effectively accommodate diverse learning needs. This aligns with the observations made by (Mallon et al., 2023) who noted that courses employing a synchronous approach, complemented by asynchronous learning, tend to yield particularly effective outcomes. Furthermore, (Yulitriana, 2021) supports this notion, highlighting that students generally prefer a blend of synchronous and asynchronous learning modalities, which enhances their overall learning experience. The integration of synchronous and asynchronous sessions is crucial in this hybrid model. Synchronous sessions facilitate direct interaction with instructors, fostering immediate feedback and engagement, while asynchronous sessions allow students to learn

at their own pace, accommodating individual learning styles and schedules. (Osman, 2022) emphasizes that the combination of these learning modes can lead to higher student satisfaction, as it caters to different preferences and promotes a more personalized learning environment. This is further corroborated by the findings of (Sari, 2023) which suggest that a blended e-learning approach can significantly enhance the effectiveness of training programs, thereby reinforcing the importance of integrating both synchronous and asynchronous elements in educational frameworks.

Moreover, the hybrid learning model encourages self-regulation, active involvement, and greater flexibility in managing study time. This aligns with the conclusions drawn by (Presley et al., 2023) who found that synchronous learning environments can lead to improved cognitive and social presence, thereby enhancing student engagement. The importance of self-regulation in learning is further emphasized by Yadav et al (2021) who noted that students in hybrid learning environments often exhibit higher levels of self-efficacy and motivation, which are critical for academic success. However, the implementation of digital learning approaches is not without its challenges. The need for adequate technological infrastructure and training for educators to enhance their digital competencies is paramount. As highlighted by (Oguguo et al., 2021) the effectiveness of online learning is heavily dependent on the technological capabilities of both students and instructors. This sentiment is echoed by the research of Turnbull et al (2021) which underscores the necessity of equipping educators with the skills and tools needed to navigate the digital landscape effectively.

**CONCLUSSION**

In conclusion, the evidence presented in this discussion highlights the effectiveness of hybrid digital learning in improving student learning outcomes in motor learning courses within physical education. The integration of synchronous and asynchronous sessions not only accommodates diverse learning needs but also fosters a more engaging and personalized educational experience. As educational institutions continue to navigate the challenges posed by digital learning, the insights gained from this study and related research will be invaluable in shaping future pedagogical strategies.

**REFERENCES**


Aguirre, T., Aperribai, L., Cortabarría, L., Verche, E., & Borges, Á. (2022). Challenges for Teachers' and Students' Digital Abilities: A Mixed Methods Design Study. *Sustainability*, *14*(8), 4729. https://doi.org/10.3390/su14084729

Ahlgren, R., Häkkinen, S., & Eskola, A. (2020). *SUCCESS FACTORS FOR HYBRID TEACHING*. 2215–2219. https://doi.org/10.21125/inted.2020.0683

Alenezi, M., Wardat, S., & Akour, M. (2023). The Need of Integrating Digital Education in Higher Education: Challenges and Opportunities. *Sustainability*, *15*(6), 4782. https://doi.org/10.3390/su15064782

Althubyani, A. R. (2024). Digital Competence of Teachers and the Factors Affecting Their Competence Level: A Nationwide Mixed-Methods Study. *Sustainability*, *16*(7), 2796. https://doi.org/10.3390/su16072796

Cai, D., & Chen, W. (2024). *Research on Challenges and Optimization Suggestions for Digital Transformation of Education in China* (pp. 255–261). https://doi.org/10.2991/978-2-38476-253-8_31

Ding, L., & Wu, S. (2024). Digital Transformation of Education in China: A Review Against the Backdrop of the 2024 World Digital Education Conference. *Science Insights Education Frontiers*, *20*(2), 3283–3299. https://doi.org/10.15354/sief.24.re340

Goyal, S. (2012). E-Learning: Future of Education. *Journal of Education and Learning (EduLearn)*, *6*(4), 239. https://doi.org/10.11591/edulearn.v6i4.168

Hadiati, E., Dwiyanto, A., Setianingrum, D. A., & Amroini, A. Z. (2023). Hybrid Learning: Analysis of Transformation of Islamic Education in Digital Era. *International Journal of Islamic Studies Higher Education*, *2*(2), 152–170. https://doi.org/10.24036/insight.v2i2.116

İnal, Ö., Özkan, E., & Göktaş, A. (2023). The effect of attention control and academic motivation on perceived learning in hybrid occupational therapy education. *British Journal of Occupational Therapy*, *86*(8), 577–586. https://doi.org/10.1177/03080226231172333

Jeong, S.-H., & Chung, J.-Y. (2023). University Students' Satisfaction and Evaluations of Synchronous Online Learning for Physical Education Courses. *Academic Journal of Interdisciplinary Studies*, *12*(3), 33. https://doi.org/10.36941/ajis-2023-0057

Kantcheva, R. B., & Bickle, E. (2023). Inclusive learning development practices: the consequences of flexibility and choice in the hybrid era. *Journal of Learning Development in Higher Education*, *26*. https://doi.org/10.47408/jldhe.vi26.886

Kurniawati, D., & Mardiningrum, A. (2022). Students' Strategies and Challenges to Understand Materials in Asynchronous Learning. *Proceedings Universitas Muhammadiyah Yogyakarta Undergraduate Conference*, *2*(1), 65–76. https://doi.org/10.18196/umygrace.v2i1.414

Lu, C. Y., & Chen, B. T. (2011). The Potential for Active Online Learning in Taiwanese Tourism Degree Programs Based on Online Educational Experiences of Graduate Students. *Journal of Teaching in Travel & Tourism*, *11*(3), 271–288. https://doi.org/10.1080/15313220.2011.597635

Mallon, S., Richards, C., & Rixon, A. (2023). Student and teacher experiences of online synchronous learning. *Journal of Applied Research in Higher Education*, *15*(5), 1688–1705. https://doi.org/10.1108/JARHE-01-2022-0011

Mariati, N. K. S., Artini, L. P., & Marsakawati, N. P. E. (2022). Students' Perception of Blended Learning at Junior High School (Combination of Synchronous and Asynchronous Learning). *IDEAS: Journal on English Language Teaching and Learning, Linguistics and Literature*, *10*(2), 1235–1245. https://doi.org/10.24256/ideas.v10i2.3034

Melnyk, M., Blyznyukov, A., & Cieślik, J. (2023). The impact of digital education initiatives. *SocioEconomic Challenges*, *7*(3), 1–9. https://doi.org/10.61093/sec.7(3).1-9.2023

Moustakas, L., & Robrade, D. (2022). The Challenges and Realities of E-Learning during COVID-19: The Case of University Sport and Physical Education. *Challenges*, *13*(1), 9. https://doi.org/10.3390/challe13010009

Northey, G., Bucic, T., Chylinski, M., & Govind, R. (2015). Increasing Student Engagement Using Asynchronous Learning. *Journal of Marketing Education*, *37*(3), 171–180. https://doi.org/10.1177/0273475315589814

Ogla, R. A. S., & Mohammed, J. (2016). Implement Interactive E-Learning System Based on Cloud Computing. *Engineering and Technology Journal*, *34*(6B), 786–796. https://doi.org/10.30684/etj.34.6B.8

Oguguo, B. C. E., Ocheni, C. A., & Adebayo, F. K. (2021). STUDENTS` ACHIEVEMENT IN ONLINE TEST AND MEASUREMENT COURSE IN SYNCHRONOUS AND ASYNCHRONOUS E-LEARNING PLATFORM. *European Journal of Open Education and E-Learning Studies*, *6*(2). https://doi.org/10.46827/ejoe.v6i2.3966

Osman, S. Z. M. (2022). Combining Synchronous and Asynchronous Learning: Student Satisfaction with Online Learning using Learning Management Systems. *Journal of Education and E-Learning Research*, *9*(3), 147–154. https://doi.org/10.20448/jeelr.v9i3.4103

Palmer, R. H., Moulton, M. K., Stone, R. H., Lavender, D. L., Fulford, M., & Phillips, B. B. (2022). The impact of synchronous hybrid instruction on students' engagement in a pharmacotherapy course. *Pharmacy Practice*, *20*(1), 2611–2611. https://doi.org/10.18549/PharmPract.2022.1.2611

Presley, R. G., Cumberland, D. M., & Rose, K. (2023). A Comparison of Cognitive and Social Presence in Online Graduate Courses: Asynchronous vs. Synchronous Modalities. *Online Learning*, *27*(2). https://doi.org/10.24059/olj.v27i2.3046

Rijst, R. Van Der, Guo, P., & Admiraal, W. (2023). Student engagement in hybrid approaches to teaching in higher education. *Revista de Investigación Educativa*, *41*(2), 315–336. https://doi.org/10.6018/rie.562521

Robertsone, G., & Lapina, I. (2022). Digital Transformation in Higher Education: Drivers, Success Factors, Benefits and Challenges. *Human, Technologies and Quality of Education, 2022*, 152–168. https://doi.org/10.22364/htqe.2022.11

Rozi, F., Putri, M. W., & Wijaya, M. R. A. (2021). E-Learning System For Physical Education In IAIN Salatiga Using Google Classroom. *EDUKATIF : JURNAL ILMU PENDIDIKAN*, *3*(2), 270–277. https://doi.org/10.31004/edukatif.v3i2.268

Sari, I. N. (2023). Effectiveness of Implementing Synchronous and Asynchronous Blended E-Learning in Stunting Prevention and Treatment Training Programs. *JTP - Jurnal Teknologi Pendidikan*, *25*(1), 101–106. https://doi.org/10.21009/jtp.v25i1.34951

Tarazi, A., & Ortega-Martín, J. L. (2023). Enhancing EFL students' engagement in online synchronous classes: The role of the Mentimeter platform. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1127520

Turnbull, D., Chugh, R., & Luck, J. (2021). Transitioning to E-Learning during the COVID-19 pandemic: How have Higher Education Institutions responded to the challenge? *Education and Information Technologies*, *26*(5), 6401–6419. https://doi.org/10.1007/s10639-021-10633-w

VanLeeuwen, C. A., Veletsianos, G., Belikov, O., & Johnson, N. (2020). Institutional Perspectives on Faculty Development for Digital Education in Canada. *Canadian Journal of Learning and Technology*, *46*(2). https://doi.org/10.21432/cjlt27944

Yadav, S. K., Para, S., Singh, G., Gupta, R., Sarin, N., & Singh, S. (2021). Comparison of asynchronous and synchronous methods of online teaching for students of medical laboratory technology course. *Journal of Education and Health Promotion*, *10*(1), 232. https://doi.org/10.4103/jehp.jehp_1022_20

Yulitriana. (2021). Synchronous or Asynchronous: Students' Perceptions on Online Learning During the Pandemic. *EBONY: Journal of English Language Teaching, Linguistics, and Literature*, *1*(1), 54–59. https://doi.org/10.37304/ebony.v1i1.3101

Zhu, Y., Zuo, H., & Chen, Y. (2024). *Digital Transformation in Vocational Education: Challenges, Strategies, and an Experimental Proposal* (pp. 643–650). https://doi.org/10.2991/978-94-6463-242-2_79