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# HYBRID LEARNING RESOURCES AND STUDENT ENGAGEMENT IN HIGHER EDUCATION: A SECONDARY DATA ANALYSIS

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## ABSTRACT

The growing adoption of hybrid learning has transformed teaching practices in higher education, combining digital resources with traditional face-to-face instruction. This study explores the relationship between hybrid learning resources, student engagement, and academic performance through secondary data analysis. Data were drawn from a range of sources: institutional records, large-scale educational surveys, and publicly available empirical datasets involving undergraduate students with previous experience in hybrid learning environments. These datasets included demographic information, student engagement metrics, and academic performance indicators such as GPA and course grades. Descriptive statistics were applied to summarize data distributions, while Pearson correlation analyses examined relationships between hybrid learning resources,

*student engagement, and academic performance. Multiple regression models were used to assess the predictive influence of these variables on academic outcomes, with a focus on how engagement mediates the relationship between hybrid learning resources and performance outcomes. The results indicate statistically significant positive relationships between the use of hybrid learning resources and student engagement, as well as between student engagement and academic performance. Regression analysis further shows that student engagement plays a significant mediating role in academic performance within hybrid learning environments. Engagement was identified as a key factor linking instructional resources to improved academic outcomes, suggesting that its enhancement can lead to better learning results. Overall, the findings demonstrate the pedagogical and technological value of well-integrated hybrid learning resources in promoting student engagement and supporting academic success in higher education. By leveraging secondary data from real-world institutional settings, this study contributes empirical evidence relevant to instructional design, educational technology integration, and institutional policy.*

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**KEYWORDS:** Hybrid Learning; Student Engagement; Academic Performance; Higher Education; Digital Learning Resources; Blended Learning; Secondary Data Analysis.

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## 1. INTRODUCTION

The widespread adoption of digital technologies has reshaped educational practices in higher education worldwide, prompting institutions to reconsider traditional classroom models and adopt more flexible instructional designs. Among these approaches, hybrid learning—integrating face-to-face instruction with online digital resources—has gained prominence as a strategy for enhancing student engagement and academic performance. This shift has been driven not only by technological advancements but also by global disruptions such as the COVID-19 pandemic, which revealed limitations in both exclusively face-to-face and fully online instructional models and highlighted the need for more resilient and adaptable educational frameworks.

Hybrid learning environments typically combine synchronous and asynchronous learning activities, allowing students to access instructional materials, engage in discussions, and interact with peers and instructors through both digital and in-person modalities. Theoretical and empirical work suggests that such integration can support diverse learning preferences, promote learner autonomy, and improve accessibility, particularly for students with varying schedules and backgrounds. Recent systematic reviews emphasize that the effectiveness of hybrid learning depends not merely on technological infrastructure, but on the pedagogical coherence with which digital tools are aligned with learning objectives and assessment practices.

Student engagement remains a central concern in higher education research and is commonly conceptualized as a multidimensional construct encompassing behavioral, cognitive, and emotional components. Extensive evidence links higher levels of engagement to improved academic achievement, persistence, and student satisfaction. Emerging research indicates that hybrid learning models may foster student engagement by providing flexible access to learning resources and facilitating interaction across multiple instructional modalities. Systematic reviews of blended and hybrid learning report moderate to strong positive effects on student engagement and learning outcomes, particularly when multimedia resources and active learning strategies are effectively integrated.

Academic performance constitutes another critical outcome associated with instructional design in higher education. Prior empirical studies conducted across diverse educational contexts have shown that hybrid learning can positively influence academic achievement when students are able to

navigate and utilize both online and in-person components effectively. Quasi-experimental and large-scale studies suggest that students in hybrid learning environments often demonstrate higher levels of engagement and improved academic performance compared to those in traditional instructional settings. However, these outcomes remain contingent on factors such as technological access, instructional quality, and institutional support.

Despite growing scholarly interest, existing research on hybrid learning in higher education frequently examines student engagement or academic performance in isolation, with fewer studies investigating the relationship between these constructs within a single empirical framework. Moreover, much of the literature relies on institution-specific or small-scale primary data, limiting the generalizability of findings across contexts. There remains a need for research that leverages secondary data sources to examine how hybrid learning resources relate simultaneously to student engagement and academic performance across real-world higher education settings.

In addition, variations in institutional implementation, learner preparedness, and access to digital resources suggest that the effectiveness of hybrid learning approaches may differ substantially across contexts. Addressing these gaps is essential for informing instructional design decisions, institutional policy, and professional development initiatives aimed at supporting effective and sustainable hybrid learning practices.

Accordingly, this study investigates the relationship between hybrid learning resources, student engagement, and academic performance in higher education using a secondary data analysis approach. By examining large-scale and institutionally collected datasets, the study provides empirical insights into how hybrid learning resources are associated with student engagement and academic outcomes, contributing to the growing evidence base informing hybrid instructional design and policy in higher education.

### 1.1. Research Questions

1. What is the relationship between hybrid learning resources and student engagement in higher education?
2. How are hybrid learning resources associated with students' academic performance in higher education?
3. To what extent does student engagement relate to academic performance within hybrid

learning contexts?

## 2. LITERATURE REVIEW

### 2.1. *Hybrid Learning in Higher Education*

Hybrid learning has become a central instructional model in higher education, integrating face-to-face teaching with online learning components to enhance flexibility, accessibility, and learning effectiveness. Unlike emergency remote teaching, hybrid learning is widely conceptualized as a purposefully designed pedagogical approach in which digital tools, instructional strategies, and assessment practices are coherently aligned across online and in-person modalities (Garrison & Vaughan, 2022). Post-pandemic research has reinforced the transition of hybrid learning from a temporary response to a strategic instructional model adopted by institutions seeking to balance educational quality, resilience, and student-centered learning (Zhu et al., 2023). Recent systematic reviews further indicate that the effectiveness of hybrid learning depends not on modality alone, but on the quality of instructional design and the level of institutional support provided to both instructors and learners (Bond et al., 2024).

### 2.2. *Hybrid Learning Resources and Instructional Design*

Hybrid learning environments rely heavily on digital learning resources, including learning management systems, recorded lectures, and interactive multimedia content, to support continuity and engagement across learning modalities. Prior research suggests that the pedagogical value of these resources lies in their capacity to facilitate self-paced learning, enable repeated engagement with course content, and provide timely formative feedback (Martin et al., 2023). However, the presence of digital resources alone does not guarantee positive learning outcomes. Instructional design must ensure that online components are intentionally aligned with learning objectives and assessment strategies to prevent cognitive overload and student disengagement. Empirical studies demonstrate that the coherent integration of digital learning resources significantly enhances student engagement and students' perceived value of the learning experience, highlighting instructional quality as a critical determinant of hybrid learning effectiveness (Kohnke & Moorhouse, 2024).

### 2.3. *Student Engagement in Hybrid Learning Environments*

Student engagement is widely recognized as a key predictor of academic success and is commonly conceptualized as a multidimensional construct encompassing behavioral, cognitive, and emotional components. Extensive research links higher levels of engagement to improved academic achievement, persistence, and student satisfaction in higher education contexts. Recent studies indicate that hybrid learning environments can enhance student engagement by offering flexible access to learning materials and fostering interaction among students and instructors across multiple modalities (Bond & Bedenlier, 2023). Systematic reviews of blended and hybrid learning approaches report consistent positive relationships between instructional design features—such as active learning strategies and continuous feedback—and student engagement outcomes (Bond et al., 2024). Nevertheless, engagement levels vary across contexts and are influenced by factors including students' digital literacy, instructional clarity, and the degree of alignment between online and face-to-face components (Fredricks et al., 2019).

### 2.4. *Academic Performance in Hybrid Learning Contexts*

Research examining academic performance in hybrid learning settings generally reports positive outcomes when students effectively navigate both digital and in-person instructional components. Meta-analytic studies suggest that hybrid learning can be as effective as, or more effective than, traditional face-to-face instruction when grounded in sound pedagogical principles (Means et al., 2014; Zhu et al., 2023). Empirical studies conducted in post-pandemic higher education contexts further demonstrate that hybrid learning environments are associated with improved academic achievement, partly due to sustained engagement with learning materials and increased flexibility in study patterns (Martin et al., 2023). However, variability in academic performance outcomes persists across institutions and learner populations, indicating that hybrid learning effectiveness is contingent upon moderating factors such as technological access, learner preparedness, and institutional support (Kohnke & Moorhouse, 2024).

### 2.5. *Broader Perspectives on Blended and Hybrid Learning*

The broader literature situates hybrid learning within a transformative shift in higher education driven by technological innovation and evolving learner expectations (Allen et al., 2016; Picciano,

2017). Foundational models of blended learning emphasize purposeful instructional design, structured online activities, and active learning strategies as essential components for promoting student participation and learning effectiveness (Singh, 2003; Salmon, 2013). Policy-oriented reports similarly highlight the role of hybrid learning in supporting educational continuity and institutional resilience during periods of disruption, including the COVID-19 pandemic (OECD, 2020; Hodges et al., 2020; UNESCO, 2021). Prior research also underscores the importance of aligning educational technologies with pedagogical objectives and institutional support systems to ensure meaningful learning outcomes (Cleveland-Innes & Wilton, 2018; Schindler et al., 2017).

### 2.6. Research Gap

Despite the expanding body of literature on hybrid learning, several gaps remain. Many studies focus on student engagement or academic performance as isolated outcomes, with fewer investigations examining the relationship between these constructs within a single empirical framework. Moreover, a substantial portion of existing research relies on institution-specific or small-scale primary data, limiting the generalizability of findings across higher education contexts. There is a need for research that leverages secondary data sources to examine how hybrid learning resources relate simultaneously to student engagement and academic performance in real-world institutional settings (Bond et al., 2024).

Accordingly, this study addresses these gaps by examining the relationship between hybrid learning resources, student engagement, and academic

performance using a secondary data analysis approach. By analyzing large-scale and institutionally collected datasets, the study contributes empirical evidence that clarifies how hybrid learning resources are associated with student engagement and academic outcomes in higher education.

## 3. METHODS

### 3.1. Research Design

This study employed a secondary data analysis design to examine the relationships between hybrid learning resources, student engagement, and academic performance in higher education. Rather than collecting primary data, the study analyzed pre-existing datasets obtained from institutional records, large-scale educational surveys, and previously published empirical research. Secondary data analysis enables the examination of learning phenomena across authentic educational contexts and allows for broader generalizability by leveraging data collected at scale. This design is particularly suitable for investigating hybrid learning practices, which are widely implemented across institutions and documented through institutional and national data sources.

### 3.2. Data Sources

Secondary data were drawn from three primary sources to ensure contextual diversity and robustness of analysis. The datasets included measures related to hybrid learning resources, student engagement, academic performance, and relevant demographic variables. All datasets were originally collected for educational assessment and research purposes and made available for secondary analysis.

**Table 1: Characteristics Of Secondary Data Sources.**

Data Source	Context	Sample Characteristics	Data Collection Period
<b>Institutional records</b>	Higher education institutions	Undergraduate students	Specified by source
<b>Public educational datasets</b>	National / international surveys	Undergraduate students	Specified by source
<b>Published research datasets</b>	Multiple higher education contexts	Undergraduate students	Specified by source

The datasets included variables such as student engagement levels, academic performance indicators (e.g., GPA and course grades), and demographic information, originally collected through institutional assessments, surveys, and course evaluations.

### 3.3. Measurement Instruments

All study variables were operationalized using validated instruments embedded within the secondary datasets. These instruments have been

widely applied in higher education research and demonstrate established reliability and construct validity.

#### 3.3.1. Hybrid Learning Resources

Hybrid learning resources were measured through indicators reflecting students' access to and use of integrated digital and face-to-face instructional tools, including learning management systems, recorded lectures, and interactive digital content.

**Table 2: Measurement Of Hybrid Learning Resources.**

Dimension	Description	Measurement Source	Scale
<b>Access to resources</b>	Availability of digital and hybrid learning materials	Institutional surveys	Likert (1-5)
<b>Frequency of use</b>	Regular use of LMS and digital tools	LMS records / surveys	Ordinal
<b>Instructional integration</b>	Alignment between online and in-person activities	Course evaluations	Likert (1-5)
<b>Flexibility</b>	Ability to access materials asynchronously	Institutional surveys	Likert (1-5)

**3.3.2. Student Engagement**

Student engagement was conceptualized as a multidimensional construct comprising behavioral,

cognitive, and emotional engagement. Engagement indicators were derived from validated student engagement surveys commonly used in higher education research.

**Table 3: Measurement Of Student Engagement.**

Engagement Dimension	Description	Measurement Source	Scale
<b>Behavioral engagement</b>	Participation in learning activities	Engagement surveys	Likert (1-5)
<b>Cognitive engagement</b>	Investment in learning and understanding	Engagement surveys	Likert (1-5)
<b>Emotional engagement</b>	Interest, motivation, and sense of belonging	Engagement surveys	Likert (1-5)

**3.3.3. Academic Performance**

Academic performance was measured using

objective achievement indicators obtained from institutional academic records.

**Table 4: Measurement Of Academic Performance.**

Indicator	Description	Data Source	Scale
<b>Grade Point Average (GPA)</b>	Cumulative academic achievement	Academic records	Continuous
<b>Course grades</b>	Performance in individual courses	Academic records	Continuous

**3.3.4. Demographic And Control Variables**

To account for contextual and individual

differences, demographic and academic background variables were included as control variables in the analysis.

**Table 5: Demographic And Control Variables.**

Variable	Description	Data Source	Scale
<b>Gender</b>	Self-reported gender	Institutional records	Categorical
<b>Academic level</b>	Year of study	Institutional records	Ordinal
<b>Field of study</b>	Academic discipline	Institutional records	Categorical

**3.4. Data Analysis**

Data analysis was conducted in three stages. First, descriptive statistics were used to summarize the characteristics of the datasets and the distribution of key study variables. Second, Pearson correlation analyses were conducted to examine the relationships between hybrid learning resources,

student engagement, and academic performance. Third, multiple regression analyses were performed to assess the extent to which hybrid learning resources and student engagement were associated with academic performance. Cross-dataset comparisons were also conducted to identify variations across institutional and contextual settings.

**Table 6: Analytical Procedures.**

Analysis Type	Purpose
<b>Descriptive statistics</b>	Summarize sample characteristics and variable distributions
<b>Correlation analysis</b>	Examine relationships among key variables
<b>Regression analysis</b>	Assess predictive relationships between variables
<b>Cross-comparative analysis</b>	Identify contextual variations across datasets

**3.5. Ethical Considerations**

As this study relied exclusively on secondary

data, no new data were collected from human participants. All datasets used were obtained from publicly available sources or previously conducted

studies that had received ethical approval from the respective institutions. The datasets were fully anonymized prior to analysis, and no personally identifiable information was accessed. The study adhered to ethical standards governing secondary data use and complied with the principles outlined in the Declaration of Helsinki.

#### 4. RESULTS

##### 4.1. Participant Characteristics

The secondary datasets included undergraduate

students enrolled in higher education institutions with prior exposure to hybrid learning environments. Descriptive statistics indicated a relatively balanced gender distribution, with female students representing 54% of the sample and male students accounting for 46%. Participants were drawn across academic levels from the first to the fourth year of study. Regarding disciplinary background, 38% were enrolled in humanities programs, 42% in science-related fields, and 20% in other academic disciplines.

**Table 7: Participant Demographic Characteristics.**

Characteristic	Category	Percentage (%)
Gender	Male / Female	46% / 54%
Academic level	First-Fourth year	100%
Field of study	Humanities / Sciences / Other	38% / 42% / 20%

##### 4.2. Descriptive Statistics of Key Variables

Students reported moderate to high levels of engagement with hybrid learning resources (M = 3.78, SD = 0.62). Overall student engagement was similarly high (M = 3.85, SD = 0.58), indicating

substantial behavioral, cognitive, and emotional involvement in hybrid learning contexts. Academic performance demonstrated moderate variability across the sample, with a mean value of 3.42 (SD = 0.54), reflecting expected differences in achievement outcomes within higher education environments.

**Table 8: Descriptive Statistics of Key Variables.**

Variable	Mean	Standard Deviation	Minimum	Maximum
Hybrid learning resources	3.78	0.62	1.90	4.90
Student engagement	3.85	0.58	2.10	4.95
Academic performance	3.42	0.54	2.00	4.80

##### 4.3. Relationship Between Hybrid Learning Resources and Student Engagement

Pearson correlation analysis revealed a statistically significant positive relationship between hybrid learning resource use and overall student

engagement ( $r = 0.49, p < .01$ ). This finding indicates that increased access to and utilization of integrated digital and face-to-face learning tools were associated with higher levels of behavioral participation, cognitive investment, and emotional involvement in learning activities

**Table 9: Correlation Between Hybrid Learning Resources and Student Engagement.**

Variable	Student Engagement
Hybrid learning resources	$r = 0.49^{**}$

Note.  $P < .01$

##### 4.4. Relationship Between Hybrid Learning Resources and Academic Performance

Multiple regression analysis demonstrated that hybrid learning resources significantly predicted academic performance ( $\beta = 0.31, SE = 0.07, t = 4.43, p$

$< .001$ ). The model explained 24% of the variance in academic performance ( $R^2 = 0.24$ ), suggesting that students who more actively engaged with hybrid learning tools tended to achieve higher academic outcomes

**Table 10: Regression Analysis Predicting Academic Performance.**

Predictor	$\beta$	SE	t	p
Hybrid learning resources	0.31	0.07	4.43	$< .001$

$R^2 = 0.24$

##### 4.5. Combined Effects of Hybrid Learning Resources and Student Engagement

When hybrid learning resources and student engagement were simultaneously entered into the

regression model, student engagement emerged as a strong and significant predictor of academic performance ( $\beta = 0.42$ ,  $p < .001$ ), while hybrid learning resources retained a smaller but still meaningful contribution. The combined model

accounted for 39% of the variance in academic performance ( $R^2 = 0.39$ ; Adjusted  $R^2 = 0.38$ ). These results indicate that engagement plays a central role in explaining how hybrid learning resources translate into improved academic outcomes.

**Table 11: Regression Model Including Hybrid Learning Resources and Student Engagement.**

Predictor	$\beta$	SE	t	p
Hybrid learning resources	0.31	0.07	4.43	< .001

$R^2 = 0.39$  adjusted  $R^2 = 0.38$

#### 4.6. Qualitative Insights from Secondary Data

Although the primary focus of this study was quantitative analysis, qualitative insights were extracted from open-ended responses reported in the secondary datasets. These responses provided contextual understanding of students' experiences with hybrid learning resources. Across datasets, students consistently emphasized the value of flexibility, accessibility, and the ability to engage with learning materials at their own pace. The opportunity to revisit recorded lectures and digital content was frequently associated with enhanced understanding and sustained motivation. Additionally, students reported that the integration of digital tools with face-to-face instruction supported deeper engagement with course content.

### 5. SUMMARY OF RESULTS

Overall, the findings demonstrate that hybrid learning resources are positively associated with student engagement and academic performance in higher education. Student engagement emerged as a key explanatory factor linking hybrid learning resources to improved academic outcomes. These results highlight the interconnected relationships among hybrid instructional resources, engagement processes, and academic achievement within real-world higher education settings.

### 6. DISCUSSION

The present study examined the relationships between hybrid learning resources, student engagement, and academic performance using secondary data across higher education contexts. The findings demonstrate that increased use of hybrid learning resources is associated with higher levels of student engagement and improved academic performance. These results reinforce the growing consensus that hybrid learning, when pedagogically integrated, constitutes an effective instructional approach in contemporary higher education.

The moderate to strong positive correlation between hybrid learning resources and student engagement aligns with engagement theory, which

emphasizes the role of learning environments in shaping students' behavioral, cognitive, and emotional involvement. Access to flexible digital resources, opportunities for asynchronous learning, and structured integration of online and face-to-face activities appear to foster sustained student participation and motivation. This supports prior evidence suggesting that engagement is not merely a learner trait but a product of instructional design and learning context.

The significant predictive relationship between hybrid learning resources and academic performance further confirms findings from prior blended and hybrid learning research indicating that well-designed hybrid environments can enhance learning outcomes. The observed effect size ( $R^2 = 0.24$ ) reflects a meaningful contribution of instructional resources to academic success within higher education settings.

Importantly, the combined regression model revealed that student engagement accounted for a substantial proportion of the variance in academic performance, surpassing the direct effect of hybrid learning resources alone. This finding supports theoretical models positioning engagement as a mediating mechanism through which instructional design influences learning outcomes. Rather than technology itself driving academic success, the results suggest that hybrid learning resources exert their impact primarily by fostering deeper student engagement.

Qualitative insights drawn from the secondary datasets further contextualize these quantitative findings. Students consistently highlighted flexibility, accessibility, and the ability to revisit learning materials as central advantages of hybrid learning environments. These experiential accounts reflect self-regulated learning theory, which emphasizes repeated exposure, learner autonomy, and control over learning pace as drivers of academic success.

Overall, the findings underscore that the effectiveness of hybrid learning lies not in the mere presence of digital tools but in their purposeful pedagogical integration to support engagement,

autonomy, and continuity of learning. By leveraging large-scale secondary data, this study strengthens the generalizability of hybrid learning benefits across institutional contexts.

## 7. LIMITATIONS AND IMPLICATIONS

### 7.1. Limitations

Several limitations should be acknowledged when interpreting the findings of this study. First, the reliance on secondary data constrained the level of control over variable operationalization, measurement instruments, and data collection procedures. Although the datasets employed established and validated measures, variations across institutions and surveys may have influenced the consistency of measurement.

Second, the use of cross-sectional secondary data limits the ability to draw causal inferences. While the analyses identified significant associations between hybrid learning resources, student engagement, and academic performance, longitudinal data would be required to more precisely examine causal pathways and changes over time.

Third, the study focused primarily on undergraduate populations within higher education contexts, which may limit the generalizability of findings to postgraduate learners or professional education settings. Additionally, contextual factors such as institutional infrastructure, instructor practices, and students' digital literacy were not directly measured and may have moderated the observed relationships.

Finally, qualitative insights were derived from open-ended responses embedded within secondary datasets rather than from primary qualitative data collection. As such, these insights should be interpreted as contextual illustrations rather than as comprehensive qualitative analysis.

### 7.2. Practical Implications

Despite these limitations, the findings offer several practical implications for higher education

institutions. First, institutions should prioritize the pedagogical integration of hybrid learning resources rather than focusing solely on technological provision. Learning management systems, recorded lectures, and digital content are most effective when aligned with clear learning objectives and supported by active learning strategies.

Second, instructional design efforts should explicitly target student engagement as a mechanism for improving academic performance. Faculty development initiatives can support instructors in designing hybrid courses that foster interaction, feedback, and meaningful student participation across both online and face-to-face modalities.

Third, institutional policies should recognize hybrid learning as a strategic instructional model rather than a temporary or supplementary approach. Investment in digital infrastructure, instructional design support, and ongoing evaluation of hybrid practices can enhance the sustainability and effectiveness of hybrid learning environments.

### 7.3. Implications For Policy and Future Research

At the policy level, the findings support the inclusion of hybrid learning within broader institutional and national strategies for higher education resilience and accessibility. Policymakers should consider frameworks that encourage evidence-based hybrid instructional design and support data-driven evaluation of learning outcomes.

Future research should build on this study by employing longitudinal and mixed-methods designs to further examine causal mechanisms and learner experiences within hybrid learning environments. Additionally, research exploring disciplinary differences, instructor practices, and equity-related factors such as digital access and inclusion would provide deeper insight into how hybrid learning can be optimized across diverse higher education contexts.

## REFERENCES

- Allen, I. E., Seaman, J., Poulin, R., & Straut, T. T. (2016). Online report card: Tracking online education in the United States. *Online Learning Consortium*.
- Anderson, T. (2017). How communities of inquiry drive teaching and learning in the digital age. *Northwest Journal of Teacher Education*, 12(1), 4. <https://doi.org/10.15760/nwjte.2017.12.1.4>
- Bernard, R. M., Borokhovski, E., Schmid, R. F., Tamim, R. M., & Abrami, P. C. (2014). A meta-analysis of blended learning and technology use in higher education. *Educational Research Review*, 12, 1-16. <https://doi.org/10.1016/j.edurev.2014.02.001>
- Bond, M., & Bedenlier, S. (2023). Facilitating student engagement through blended learning in higher education. *Educational Technology Research and Development*, 71(3), 1121-1141. <https://doi.org/10.1007/s11423-022-10178-9>

- Bond, M., & Bedenlier, S. (2024). Student engagement in technology-enhanced learning. *International Journal of Educational Technology in Higher Education*, 21(1), 18.
- Bond, M., Zawacki-Richter, O., & Nichols, M. (2024). Revisiting five decades of blended and hybrid learning research: A systematic review. *Computers & Education*, 199, 104764. <https://doi.org/10.1016/j.compedu.2023.104764>
- Broadbent, J., & Poon, W. L. (2015). Self-regulated learning strategies in online learning. *The Internet and Higher Education*, 27, 1–13. <https://doi.org/10.1016/j.iheduc.2015.04.007>
- Carrillo, C., & Flores, M. A. (2020). COVID-19 and teacher education: A literature review. *European Journal of Teacher Education*, 43(4), 466–487. <https://doi.org/10.1080/02619768.2020.1821184>
- Cleveland-Innes, M., & Wilton, D. (2018). Guide to blended learning. *Commonwealth of Learning*.
- Davis, F. D. (1989). Perceived usefulness and ease of use of technology. *MIS Quarterly*, 13(3), 319–340.
- Fredricks, J. A., Filsecker, M., & Lawson, M. A. (2019). Student engagement. *Educational Psychologist*, 54(3), 173–190. <https://doi.org/10.1080/00461520.2019.1619655>
- Garrison, D. R., & Vaughan, N. D. (2022). *Blended learning in higher education* (2nd ed.). Routledge.
- Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment. *The Internet and Higher Education*, 2(2–3), 87–105.
- Graham, C. R. (2019). Current research in blended learning. *Handbook of Distance Education*, 173–188.
- Hodges, C. et al. (2020). Emergency remote teaching. *Educause Review*.
- Hrastinski, S. (2019). What do we mean by blended learning? *TechTrends*, 63(5), 564–569. <https://doi.org/10.1007/s11528-019-00375-5>
- Kahu, E. R. (2013). Framing student engagement in higher education. *Studies in Higher Education*, 38(5), 758–773.
- Kahu, E. R., & Nelson, K. (2018). Student engagement mechanisms. *Higher Education Research & Development*, 37(1), 58–71.
- Kohnke, L., & Moorhouse, B. L. (2024). Adapting higher education to hybrid learning. *System*, 120, 102995. <https://doi.org/10.1016/j.system.2023.102995>
- Kuh, G. D. (2009). The National Survey of Student Engagement. *New Directions for Institutional Research*, 2009(141), 5–20.
- Martin, F., & Bolliger, D. U. (2018). Engagement strategies in online learning. *Online Learning Journal*, 22(1).
- Martin, F., Polly, D., & Ritzhaupt, A. (2023). Engagement and learning outcomes in hybrid courses. *Online Learning Journal*, 27(2), 1–22.
- Means, B., Toyama, Y., Murphy, R., & Baki, M. (2014). Effectiveness of online and blended learning. *Teachers College Record*, 115(3).
- Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). E-learning and online learning definitions. *The Internet and Higher Education*, 14(2), 129–135.
- OECD. (2020). *Education responses to COVID-19*. OECD Publishing.
- Picciano, A. G. (2017). Theories and frameworks for online education. *Online Learning Journal*, 21(3).
- Prince, M. (2004). Does active learning work? *Journal of Engineering Education*, 93(3), 223–231.
- Salmon, G. (2013). *E-tivities: The key to active online learning* (2nd ed.). Routledge.
- Schindler, L. A., et al. (2017). Computers in education: A meta-review. *International Journal of Educational Technology in Higher Education*, 14(1), 25.
- Singh, H. (2003). Building effective blended learning programs. *Educational Technology*, 43(6), 51–54.
- Sun, A., & Chen, X. (2016). Online education challenges. *Journal of Information Technology Education*, 15, 157–190.
- Tinto, V. (2017). Through the eyes of students. *Journal of College Student Retention*, 19(3), 254–269.
- UNESCO. (2021). *Reimagining our futures together*. UNESCO Publishing.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). Technology acceptance model. *MIS Quarterly*, 27(3), 425–478.
- Wang, Q., Huang, C., & Quek, C. L. (2018). Students' perspectives of blended learning. *Australasian Journal of Educational Technology*, 34(3).
- Xu, D., & Jaggars, S. S. (2014). Performance gaps in online courses. *Educational Researcher*, 43(7), 377–391.
- Zawacki-Richter, O., et al. (2020). Systematic review of online learning. *Computers & Education*, 150, 103842.
- Zhu, M., Berri, S., & Zhang, K. (2023). Designing effective hybrid learning environments. *Education and Information Technologies*, 28(4), 4521–4543.
- Zimmerman, B. J. (2002). Becoming a self-regulated learner. *Theory Into Practice*, 41(2), 64–70.
- Zimmerman, B. J., & Schunk, D. H. (2011). *Handbook of self-regulation of learning and performance*. Routledge.