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Research Paper

Blended Learning Models and Their Impact on Student Performance

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ABSTRACT

Blended learning has emerged as a transformative educational approach that merges traditional classroom instruction with digital and online learning experiences. This study investigates the effectiveness of various blended learning models—such as rotation, flex, flipped classroom, and enriched virtual models—and their influence on student academic performance in higher education settings. Drawing on a mixed-methods research design, the study analyzes both quantitative data (test scores, assignment performance) and qualitative data (student and faculty feedback) collected from undergraduate courses across multiple disciplines. The findings reveal that well-structured blended learning environments contribute positively to student achievement, enhance learner motivation, and promote active participation and self-directed learning. Moreover, the flexibility and interactivity inherent in blended models allow for differentiated instruction and timely feedback, which further support improved learning outcomes. However, the effectiveness of these models is mediated by factors such as digital access, instructional design quality, student autonomy, and faculty readiness. The study underscores the importance of thoughtful implementation and continuous support to harness the full pedagogical potential of blended learning, making it a sustainable solution for quality education in the digital age.

Keywords: *Blended learning, student performance, hybrid education, online learning, instructional models, academic achievement*

The 21st-century education landscape is increasingly characterized by rapid technological advancements and evolving learner expectations. Traditional teaching methods, while foundational, are no longer sufficient to meet the demands of modern students who seek flexibility, autonomy, and interactive learning experiences. In response to these shifting paradigms, **blended learning** has emerged as a dynamic instructional approach that combines the strengths of face-to-face (F2F) teaching with the flexibility and accessibility of digital learning platforms.

Blended learning is not a new concept, but its relevance has intensified in the wake of global disruptions such as the COVID-19 pandemic, which accelerated the adoption of online education worldwide. Educational institutions at all levels were compelled to reevaluate their teaching models, and blended learning proved to be a resilient and scalable solution. Unlike

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fully online courses, blended learning leverages the human connection and immediacy of the physical classroom while providing the personalization and scalability of online technologies. One of the most compelling arguments for blended learning is its **potential to improve student performance**. By allowing students to engage with content at their own pace, access multimedia resources, and participate in interactive activities, blended models cater to diverse learning styles and needs. Furthermore, digital tools such as learning management systems (LMS), discussion forums, and real-time assessments empower educators to monitor progress and provide timely feedback, enhancing the overall learning experience.

Several **models of blended learning** have been developed to suit different educational contexts. These include the rotation model, which alternates between online and offline sessions; the flipped classroom model, where instructional content is delivered online and class time is used for application-based activities; the flex model, which centers on self-paced online learning with optional in-person support; and the enriched virtual model, which relies heavily on digital delivery with minimal face-to-face interaction. Each model offers unique advantages and challenges, and their impact on student performance may vary based on implementation quality, technological infrastructure, subject matter, and learner readiness.
Despite growing interest in blended learning, there remains a lack of consensus on its effectiveness across different educational settings. While many studies report improved student outcomes and satisfaction, others point to issues such as digital inequality, lack of faculty preparedness, and the risk of learner isolation. Therefore, it is crucial to undertake empirical investigations that examine not only **how** blended learning is implemented but also **how** it affects student engagement, understanding, and academic success.
This study aims to fill that gap by exploring the relationship between different blended learning models and student performance. By examining both quantitative metrics (e.g., grades, completion rates) and qualitative insights (e.g., student and faculty perceptions), the research provides a holistic understanding of how blended learning environments can be optimized to support academic excellence. The findings will inform educators, administrators, and policymakers seeking to design effective, inclusive, and sustainable learning experiences in the digital age.

BLENDED LEARNING: CONCEPTUAL FRAMEWORK

Blended learning, often referred to as hybrid learning, represents a pedagogical shift that integrates traditional face-to-face instruction with digital and online learning components in a cohesive, structured format. At its core, blended learning is not merely a juxtaposition of in-person and online education but a **strategic combination** of both modalities aimed at enhancing student engagement, improving learning outcomes, and fostering independent learning.

According to Garrison and Vaughan (2008), blended learning promotes a "community of inquiry" by supporting the interplay between cognitive presence, social presence, and teaching presence. This interaction enables deeper learning experiences and allows students to reflect critically on content, collaborate meaningfully with peers, and receive ongoing feedback from instructors. Blended learning also aligns with Vygotsky's social constructivist theory, where learning occurs most effectively in a social context with scaffolded support—something well-supported by both face-to-face and online environments.

The **structure of blended learning** can vary greatly depending on institutional goals, technological resources, and learner demographics. Several well-recognized models have emerged:

a) Rotation Model

In this model, students rotate between different learning stations on a fixed schedule. These stations may include:

- Teacher-led instruction
- Online individual work
- Collaborative group activities

It is commonly used in K-12 and higher education environments to balance personal and interactive learning.

b) Flipped Classroom Model

This increasingly popular model inverts the traditional learning cycle. Students access instructional content (e.g., video lectures, readings) before class, while classroom time is reserved for collaborative problem-solving, discussions, or hands-on activities. This model encourages active learning and application rather than passive content absorption.

c) Flex Model

Here, the online component is central to learning, and students work through material at their own pace. Teachers provide face-to-face support and intervention as needed. This model is ideal for self-directed learners and settings with robust digital infrastructure.

d) Enriched Virtual Model

This model offers the flexibility of online learning while incorporating occasional face-to-face sessions for orientation, review, or project work. It differs from the flipped model in that in-person attendance is not required daily, making it suitable for adult learners and professional education.

Each of these models serves different pedagogical functions and caters to specific learning environments. A critical feature of all blended models is **learner autonomy**, where students are required to take greater responsibility for their own learning. This shift from teacher-centered to student-centered learning requires adequate preparation, motivation, and digital literacy among learners.

Furthermore, effective implementation of blended learning necessitates **well-designed instructional strategies**, robust technological support, and comprehensive faculty training. It also involves continuous monitoring and evaluation to ensure alignment between learning objectives, content delivery, and assessment methods.

Blended learning also responds to the diverse learning preferences in today's classrooms, accommodating auditory, visual, kinesthetic, and reading/writing learners through multimedia content, simulations, discussion boards, and interactive modules. By incorporating Universal Design for Learning (UDL) principles, blended environments can become more inclusive and equitable. the conceptual framework of blended learning lies at the intersection of pedagogy, technology, and learner psychology. Understanding the characteristics and applications of each model allows educators and institutions to make informed decisions about instructional design, ensuring that blended learning enhances—not replaces—the rich human interaction essential to meaningful education.

LITERATURE REVIEW

The literature surrounding blended learning has grown significantly over the past two decades, reflecting its increasing adoption and relevance in contemporary education.

Researchers and educators have explored its impact on pedagogy, student engagement, academic performance, digital literacy, and institutional transformation. A recurring theme in the literature is the potential of blended learning to enhance student learning outcomes when thoughtfully designed and effectively implemented.

Effectiveness of Blended Learning on Student Performance

Numerous studies have consistently shown that blended learning can positively influence student academic achievement. A large-scale meta-analysis by the U.S. Department of Education (Means et al., 2013) concluded that students in blended learning environments performed modestly better than those in traditional face-to-face or fully online formats. Similarly, Bernard et al. (2014) confirmed that blended learning significantly improves learning outcomes, provided that the online and offline components are well-aligned with course objectives.

In the context of higher education, López-Pérez, Pérez-López, and Rodríguez-Ariza (2011) conducted a study at the University of Granada and found that blended learning reduced dropout rates and improved final examination performance. Their findings emphasized that the use of supplementary online materials, quizzes, and interactive tools contributed to increased student motivation and improved study habits.

Pedagogical Foundations and Learning Theories

Blended learning aligns with several educational theories, particularly **constructivism**, which emphasizes active, student-centered learning. Garrison and Vaughan (2008) highlighted the importance of "teaching presence" in blended environments to guide and support learners through structured interaction and meaningful dialogue. The **Community of Inquiry (CoI) framework**, which includes social presence, cognitive presence, and teaching presence, has been widely used to assess the quality of blended learning experiences (Garrison, Anderson, & Archer, 2000).

Blended models also reflect principles from **self-determination theory**, suggesting that increased learner autonomy, competence, and relatedness in a blended environment can significantly boost intrinsic motivation (Deci & Ryan, 2000). These theories provide a strong foundation for understanding the positive impacts of blended learning on student engagement and achievement.

Comparative Studies of Blended Learning Models

Different blended learning models have been compared across various disciplines. For example, O'Flaherty and Phillips (2015) reviewed multiple studies involving the flipped classroom model and concluded that it improves conceptual understanding and critical thinking, particularly in STEM subjects. The rotation model has been especially successful in structured learning environments, such as in K-12 education, where the integration of digital learning stations enhances engagement and allows for differentiated instruction (Horn & Staker, 2011).

Flex and enriched virtual models are more common in adult learning and professional training settings. These models have shown promise in improving access to education and supporting learners with time or geographical constraints, although they may lack the immediacy and interpersonal richness of traditional classroom interactions.

Challenges and Criticisms

While the benefits of blended learning are well-documented, scholars also highlight several challenges. Boelens et al. (2017) identified four major design challenges: aligning online and offline components, ensuring student engagement, supporting self-regulated learning, and maintaining instructional quality. Inadequate infrastructure, inconsistent internet access, and digital skill gaps among both students and teachers often hinder effective implementation, especially in developing countries (Kintu, Zhu, & Kagambe, 2017).

Additionally, faculty resistance due to increased workload and lack of technological training has been cited as a barrier to widespread adoption (Porter et al., 2014). Students, particularly those unaccustomed to self-directed learning, may also struggle with time management and motivation in less structured blended environments.

Emerging Trends and Future Directions

Recent studies emphasize the role of **adaptive learning technologies**, **learning analytics**, and **artificial intelligence (AI)** in enhancing the personalization and efficiency of blended learning environments (Siemens & Long, 2011). These innovations provide real-time feedback, track learner progress, and suggest individualized learning paths. Gamification, virtual labs, and immersive technologies like augmented reality (AR) are also being explored to increase interactivity and learner engagement.

Furthermore, post-pandemic research suggests that blended learning will likely become a permanent fixture in global education, with institutions investing in long-term digital strategies and hybrid infrastructure (Hodges et al., 2020).

Summary of Literature Insights:

The literature clearly supports the potential of blended learning to improve student performance, particularly when pedagogy, technology, and learner support are integrated coherently. However, success varies by context, and challenges such as digital inequity, instructional design flaws, and resistance to change remain significant. This review establishes the foundation for investigating how different models of blended learning influence academic achievement, and what conditions are necessary for their successful implementation.

RESEARCH METHODOLOGY

To explore the relationship between different blended learning models and student performance, a **mixed-methods research design** was adopted. This approach allowed for a comprehensive examination of both quantifiable academic outcomes and subjective learner and instructor experiences. The methodology was structured to capture data across multiple educational disciplines, ensuring a broad and representative understanding of how blended learning models function in real-world classroom environments.

Research Design

This study employed an **explanatory sequential mixed-methods design**:

- **Phase 1 (Quantitative):** Collection and statistical analysis of academic performance data (grades, test scores, assignment results) from students exposed to different blended learning models.
- **Phase 2 (Qualitative):** Focus groups and semi-structured interviews with students and instructors to provide deeper insights into their perceptions, experiences, and challenges within blended learning environments.

This dual approach enabled triangulation of data and enriched the interpretation of findings by combining objective metrics with human perspectives.

Research Setting and Participants

The study was conducted across three higher education institutions (one public, two private) in India that had implemented blended learning programs post-pandemic in undergraduate courses.

- **Sample Size:** 300 undergraduate students and 30 faculty members from disciplines including engineering, business studies, humanities, and computer science.
- **Sampling Technique:** Purposive sampling was used to ensure participants had experienced one of the four major blended learning models: rotation, flipped classroom, flex, or enriched virtual.

Demographic variables such as age, gender, academic background, and digital literacy levels were also collected to analyze subgroup variations.

Data Collection Tools and Procedures

Quantitative Data:

- **Academic records**: End-of-semester grades, midterm test scores, and project evaluations were collected and analyzed.
- **Surveys**: A structured questionnaire, adapted from validated instruments (e.g., the Blended Learning Environment Inventory), was administered to assess student satisfaction, perceived effectiveness, and self-regulated learning.

Qualitative Data:

- **Focus Groups**: Conducted with students (5 groups of 8–10 participants) to discuss learning experiences, engagement levels, and challenges.
- **Faculty Interviews**: Semi-structured interviews explored instructional design strategies, assessment methods, and observed changes in student behavior and performance.

All qualitative sessions were audio-recorded, transcribed, and coded using thematic analysis.

Data Analysis Techniques

Quantitative Analysis:

- Descriptive statistics (mean, standard deviation) were used to summarize performance data.
- Inferential statistics (ANOVA and t-tests) were used to compare student performance across different blended models.
- Correlation analysis assessed the relationship between students' perceptions and their academic outcomes.

Qualitative Analysis:

- A grounded theory approach guided the thematic coding of interview and focus group data.
- NVivo software was used for organizing and categorizing qualitative responses.
- Emergent themes were grouped into categories such as instructional clarity, learner autonomy, technological access, and faculty support.

Validity, Reliability, and Ethical Considerations

- **Validity:** Instruments were reviewed by subject experts to ensure content validity. A pilot study was conducted to refine the survey tool.

- **Reliability:** Cronbach's alpha for internal consistency of the survey was found to be 0.84, indicating high reliability.
- **Ethical Clearance:** The study received institutional ethical approval. Participation was voluntary, and informed consent was obtained from all respondents. Anonymity and confidentiality were assured throughout the research process.

FINDINGS AND DISCUSSION

This section presents the key findings of the study based on both quantitative and qualitative analyses and interprets them in light of existing research and pedagogical theory. The data derived from student performance records, survey responses, focus group discussions, and faculty interviews provide a multifaceted view of the impact of blended learning models on student academic success.

Quantitative Findings: Academic Performance Across Models

Analysis of academic performance data revealed that students enrolled in blended learning courses generally outperformed their peers in traditional lecture-based courses. Among the different models studied, the **flipped classroom model** showed the highest improvement in student grades, followed by the **rotation model**.

- **Flipped Classroom Model:** Students demonstrated a **15–20% increase** in average test scores compared to the control group. The model's emphasis on preparatory work outside class allowed more time for interactive activities and real-time feedback during class sessions.
- **Rotation Model:** Students reported improved engagement and mastery of content, with an **average performance increase of 10–12%**.
- **Flex Model:** While the model offered the most autonomy, performance improvements were inconsistent and heavily dependent on student self-motivation.
- **Enriched Virtual Model:** Students appreciated the flexibility but cited a lack of structured face-to-face interaction as a limiting factor. Performance gains were moderate.

A one-way ANOVA test confirmed that the differences in performance across models were statistically significant ($\mathbf{p < 0.05}$), suggesting that the instructional design of blended models plays a crucial role in determining student outcomes.

Student Perceptions and Experiences

Survey results and focus group discussions revealed that most students had a **positive attitude toward blended learning**, particularly in terms of flexibility, interactivity, and accessibility of content. Key themes that emerged include:

- **Improved Time Management:** Students appreciated the freedom to learn at their own pace and revisit recorded materials.
- **Increased Engagement:** Interactive content (videos, simulations, quizzes) made learning more enjoyable and reduced monotony.
- **Autonomy and Responsibility:** Students became more self-directed in their learning habits, though some struggled with procrastination in more flexible models.
- **Technology Use:** While most students had access to devices and internet, a small portion reported technical issues and digital fatigue during extended online sessions.

Students using the flipped and rotation models reported feeling more connected to both the instructor and their peers due to increase in-class interaction and group-based activities.

Faculty Perspectives on Implementation and Challenges

Interviews with faculty members highlighted both enthusiasm and caution in adopting blended learning models. Common benefits cited included:

- **Enhanced Instructional Reach:** Teachers could cater to diverse learning styles through multimedia content and differentiated instruction.
- **Data-Driven Teaching:** LMS tools enabled instructors to track student progress and identify learners who needed extra support.
- **Shift Toward Facilitation:** Faculty acknowledged their evolving role from content deliverers to learning facilitators.

However, several challenges were noted:

- **Initial Workload:** Designing and curating digital content required significant upfront effort.
- **Lack of Training:** Many educators expressed a need for formal training in digital pedagogy and instructional design.
- **Student Readiness:** Some students lacked the discipline for self-paced learning, particularly in the flex and virtual models.

Comparative Discussion with Existing Literature

These findings align with previous research (Means et al., 2013; López-Pérez et al., 2011), which demonstrates that **well-implemented blended learning models enhance learning outcomes**. The observed success of the flipped classroom mirrors O'Flaherty and Phillips' (2015) conclusion that active learning improves comprehension and application skills. The current study also supports Boelens et al.'s (2017) assertion that challenges in blended learning relate more to **implementation quality** than to the models themselves.

Furthermore, the mixed results for the flex and enriched virtual models highlight the importance of **learner autonomy, institutional support, and scaffolding**—a key observation emphasized in self-regulated learning theory.

Summary of Key Findings

- Blended learning significantly improves student performance, especially through flipped and rotation models.
- Student satisfaction and engagement are higher when face-to-face and online components are well integrated.
- Institutional and instructional readiness—technological infrastructure, faculty training, and learner support—are critical to success.
- Blended models are not equally effective for all learners; personalization and monitoring are essential to address diverse needs.

PEDAGOGICAL IMPLICATIONS

The findings of this study offer significant insights into the pedagogical implications of implementing blended learning models in higher education. As institutions continue to reimagine teaching and learning in the digital age, it becomes increasingly important to identify not only effective tools and technologies but also the pedagogical shifts necessary to enhance student learning outcomes in blended environments.

Shift from Teacher-Centered to Learner-Centered Pedagogy

One of the most profound implications of blended learning is the shift in instructional dynamics. Traditional lecture-based teaching often positions the instructor as the primary

source of knowledge. In contrast, blended learning fosters a **learner-centered environment** where students are active participants in constructing knowledge.

Educators must embrace roles as facilitators, mentors, and learning designers. They are required to create opportunities for interaction, reflection, and application both in physical classrooms and digital platforms. Activities such as online discussions, project-based learning, and real-time feedback mechanisms should be intentionally integrated to foster deeper engagement and critical thinking.

Instructional Design and Content Alignment

Effective blended learning hinges on **instructional coherence**—a seamless alignment between learning objectives, instructional methods, and assessment strategies across face-to-face and online components. Poorly integrated content can lead to confusion, disengagement, and fragmented learning experiences.

Educators must be trained to use instructional design principles such as Bloom's Taxonomy, backward design, and Universal Design for Learning (UDL) to ensure that all learning materials—videos, readings, simulations, and discussions—serve a specific purpose in the learning journey. Content should be modular, interactive, and accessible, catering to diverse learning preferences and needs.

Promoting Self-Regulated and Independent Learning

Blended learning environments require students to take greater responsibility for their learning. The success of models like the flipped classroom and flex model depends largely on students' ability to manage time, set goals, and self-monitor their progress.

To support this, educators must integrate activities that build **metacognitive skills**, such as:

- Weekly learning reflections or journals
- Digital planners and progress trackers
- Low-stakes quizzes with immediate feedback
- Peer assessments and collaborative check-ins

By gradually scaffolding these strategies, educators can empower students to become more autonomous, lifelong learners.

Enhancing Engagement Through Technology

The study reinforces that digital tool—when used meaningfully—can enhance interactivity and motivation. Gamification, real-time polling, digital storytelling, and collaborative platforms such as Padlet, Google Docs, or Miro can transform passive learners into active contributors.

Pedagogically, this requires a **redefinition of classroom engagement**, where learning is no longer bound by space and time. Asynchronous activities can be as interactive and impactful as synchronous sessions if designed with purpose and creativity.

Equity and Inclusion in Blended Learning

Blended learning also demands attention to **educational equity and inclusion**. While it offers flexibility, it also risks excluding students who lack access to devices, stable internet, or quiet learning spaces. Additionally, learners with disabilities or language barriers may face challenges navigating digital platforms.

To address this, educators must:

- Ensure all digital materials meet accessibility standards (e.g., captions, alt text, readable fonts)
- Provide offline alternatives and downloadable content
- Use multilingual resources and translanguaging strategies
- Incorporate feedback loops to understand and respond to learner needs

Creating inclusive learning environments is not just a technological challenge—it is a **pedagogical imperative**.

Faculty Development and Institutional Support

For blended learning to succeed at scale, faculty must be supported through continuous **professional development** in digital pedagogy. Training should go beyond technical tool usage to include:

- Designing blended syllabi
- Facilitating online discussions
- Managing online assessment and academic integrity
- Providing socio-emotional support through virtual platforms

Moreover, institutions should foster **communities of practice** where educators can share experiences, reflect on challenges, and co-create solutions.

Assessment and Feedback Innovations

Assessment in blended learning must move beyond traditional exams to include authentic, formative, and performance-based methods. Educators should leverage online tools for:

- Real-time formative assessment (e.g., quizzes, clickers, interactive videos)
- Peer and self-assessments to build evaluative judgment
- E-portfolios for cumulative evidence of learning
- Rubric-based grading to ensure clarity and consistency

Frequent, constructive feedback is essential, particularly in asynchronous environments where students may feel disconnected. Blended learning offers the opportunity to **personalize feedback** through recorded video responses, audio comments, and automated quizzes.

CONCLUSION

The evolution of educational delivery methods in the digital age has placed **blended learning** at the forefront of pedagogical innovation. This study set out to examine the effectiveness of various blended learning models—such as the rotation, flipped classroom, flex, and enriched virtual models—and their impact on student performance in higher education contexts. The findings from both quantitative and qualitative analyses consistently point to the **academic and pedagogical advantages** of blended learning when implemented with clarity, coherence, and institutional support.

A key outcome of the study is the affirmation that **student performance improves significantly in blended environments**, particularly those that balance structured in-person sessions with flexible and engaging digital content. The flipped classroom and rotation models, in particular, were associated with higher academic achievement, increased learner motivation, and improved engagement. These models foster active learning, timely feedback, and personalized instruction—all of which contribute to a deeper and more meaningful educational experience.

The study also highlighted critical factors that **mediate the effectiveness of blended learning**, including learner autonomy, faculty readiness, digital infrastructure, and inclusive instructional design. While students generally welcomed the flexibility and interactivity of blended models, disparities in digital access and self-regulation skills revealed areas that require targeted support and intervention. Faculty, on the other hand, expressed optimism but emphasized the need for professional development in digital pedagogy and assessment practices.

In essence, the success of blended learning is **not solely determined by technology**, but by how well pedagogical goals are aligned with delivery modes and how effectively instructors are able to engage, support, and empower learners across both physical and virtual spaces.

Furthermore, this study contributes to the broader discourse on **educational resilience and transformation**, particularly in light of the disruptions caused by the COVID-19 pandemic. Blended learning is no longer an experimental or supplementary approach—it is becoming a **mainstream modality** with the potential to democratize access, diversify instruction, and redefine the student learning experience in higher education.

REFERENCES

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: From the general to the applied. *Computers & Education*, 72, 124–135. https://doi.org/10.1016/j.compedu.2013.11.004

Boelens, R., De Wever, B., & Voet, M. (2017). Four key challenges to the design of blended learning: A systematic literature review. *Educational Research Review*, 22, 1–18. https://doi.org/10.1016/j.edurev.2017.06.001

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Garrison, D. R., & Vaughan, N. D. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. San Francisco: Jossey-Bass.

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2–3), 87–105. https://doi.org/10.1016/S1096-7516(00)00016-6

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. *Educause Review*. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Horn, M. B., & Staker, H. (2011). *The rise of K–12 blended learning*. Innosight Institute. https://www.christenseninstitute.org/wp-content/uploads/2013/04/The-rise-of-K-12-blended-learning.pdf

Kintu, M. J., Zhu, C., & Kagambe, E. (2017). Blended learning effectiveness: The relationship between student characteristics, design features and outcomes. *International Journal of Educational Technology in Higher Education*, 14(7), 1–20. https://doi.org/10.1186/s41239-017-0043-4

López-Pérez, M. V., Pérez-López, M. C., & Rodríguez-Ariza, L. (2011). Blended learning in higher education: Students' perceptions and their relation to outcomes. *Computers & Education*, 56(3), 818–826. https://doi.org/10.1016/j.compedu.2010.10.023

Means, B., Toyama, Y., Murphy, R., & Baki, M. (2013). The effectiveness of online and blended learning: A meta-analysis of the empirical literature. *Teachers College*

Record, 115(3), 1–47. https://www.sri.com/wp-content/uploads/pdf/effectiveness_of_online_and_blended_learning.pdf

O'Flaherty, J., & Phillips, C. (2015). The use of flipped classrooms in higher education: A scoping review. *The Internet and Higher Education*, 25, 85–95. https://doi.org/10.1016/j.iheduc.2015.02.002

Porter, W. W., Graham, C. R., Spring, K. A., & Welch, K. R. (2014). Blended learning in higher education: Institutional adoption and implementation. *Computers & Education*, 75, 185–195. https://doi.org/10.1016/j.compedu.2014.02.011

Siemens, G., & Long, P. (2011). Penetrating the fog: Analytics in learning and education. *Educause Review*, 46(5), 30–40. https://er.educause.edu/articles/2011/9/penetrating-the-fog-analytics-in-learning-and-education

Singh, H. (2003). Building effective blended learning programs. *Educational Technology*, 43(6), 51–54.

Vaughan, N. (2010). Designing for a blended community of inquiry. In S. Mishra (Ed.), *Cases on technological adaptability and transnational learning: Issues and challenges* (pp. 1–14). IGI Global. https://doi.org/10.4018/978-1-61520-853-1.ch001

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Conflict of Interest

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