MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, Jan-June 2026, Pages: 708-715

Bridging Digital and Physical Learning Spaces: Examining Generative AI's Role in Hybrid Educational Environments

Dr. Nidhi Singh[1], Ms. Sakshi Singhal[2], Dr. Prabha Arya[3], Ms. Rashmi Arora[4]

[1]Assistant Professor, School of Management, GD Goenka University, Sohna, Gurugram, Haryana, India. 122103. Email Id: tonidhi.singh@gmail.com. ORCID ID: 0000-0003-4541-279X
[2]Assistant Professor, School of Management, GD Goenka University, Sohna, Gurugram, Haryana, India. 122103. Email Id: singhalsakshu1997@gmail.com. ORCID ID: 0009-0009-0315-1836
[3]Assistant Professor, School of Management, GD Goenka University, Sohna, Gurugram, Haryana, India. 122103. Email Id: prabhaarya@gmail.com, ORCID ID: 0000-0003-3653-3725
[4] Research Scholar, School of Management, GD Goenka University, Sohna, Gurugram, Haryana, India. 122103. Email Id: contactdnaautomation@gmail.com

Reciv 05/11/2025, Revised 30/11/2025, Accepted 10/1/2026, Published 28/1/2026

Abstract

The integration of generative artificial intelligence (AI) into hybrid educational environments represents a significant advancement in the field of education. This study investigates the impact of AI-driven tutoring systems on student engagement in both online and conventional classroom environments. This article looks at real examples from big educational technology projects to explore the benefits and challenges of using AI tutors in mixed learning environments. The analysis reveals five key dimensions through which generative AI affects student engagement: learning personalization and engagement, teacher-AI collaboration and pedagogy, learning outcomes and academic integrity, equity and access, and data privacy and ethical considerations. Positive outcomes include enhanced personalization through adaptive content delivery, improved accessibility to educational support, and data-driven pedagogical insights that enable targeted interventions. However, significant challenges emerge, including risks of over-reliance on AI assistance, academic integrity concerns, potential widening of digital divides, and questions regarding student data privacy. This study contributes to the emerging literature on AI in education by offering a comprehensive framework for understanding the multifaceted impacts of generative AI tutors on student engagement in hybrid learning environments.

Keywords

Student engagement, generative AI, hybrid learning environments, hybrid learning, AI tutors, educational technology

1. Introduction

In a time of fast technological changes and the shift in education after the pandemic, the combination of generative artificial intelligence (AI) and hybrid learning experiences is a groundbreaking area in teaching. As educational institutions strive to innovate and enhance student engagement, understanding the potential and implications of these technologies is more critical than ever. This article begins by introducing the foundational concepts of generative AI and hybrid learning environments, setting the stage for a comprehensive analysis of their impact on student learning experiences.

1.1 Generative Artificial Intelligence

The fourth industrial revolution represents a significant shift from previous industrial eras, defined by the integration of technologies operating across physical and digital spheres. AI, a cornerstone of this revolution, encompasses machines and systems that execute tasks typically requiring human intelligence, such as learning, problem-solving, and decision-making (Sarker, 2022). Among various AI types, generative AI emerges as particularly transformative for education, utilising algorithms capable of developing new content—including text, personalised learning materials, adaptive assessments, and interactive tutoring dialogues—by learning from existing educational data (Foster, 2022). Unlike traditional AI, which primarily identifies patterns and makes predictions based on past data, generative AI creates original educational outputs tailored to individual student needs (Marr, 2023). This distinction

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, Jan-June 2026, Pages: 708-715

is crucial in understanding generative AI's innovative potential in education, which extends beyond automating routine tasks to driving personalised learning and pedagogical innovation in unprecedented ways.

1.2 Hybrid learning in education

Hybrid learning is a holistic ecosystem that adopts a learner-centric approach, integrating physical, human, digital, and media content elements to offer compelling learning experiences with coherent continuity between digital and physical environments. As generative AI propels education forward, hybrid learning represents the seamless convergence of physical classroom experiences and digital learning environments. An exemplary illustration is the flipped classroom model enhanced with AI tutors, where students engage with AI-powered platforms at home to understand foundational concepts through personalised content, then participate in active, collaborative problem-solving in physical classrooms, enhancing both depth and application of learning (Chua & Islam, 2020). Substantial institutional investments and rapid post-pandemic adoption underscore hybrid learning's significance, with educational institutions worldwide intensifying digital transformation initiatives and adopting hybrid models as the new standard (Hodges et al., 2020; Raes et al., 2020).

1.3 Student Engagement

In the evolving landscape of education, understanding student engagement remains paramount, as it encompasses interactions between institutions and learners from sparking initial curiosity through sustained participation to forging lifelong learning connections. This multifaceted concept is typically conceptualised across three core dimensions: behavioural engagement (active participation in learning activities), emotional engagement (interest, enjoyment, and sense of belonging), and cognitive engagement (deep investment in understanding and mastering content) (Fredricks et al., 2004). High levels of engagement demonstrably improve learning outcomes, student satisfaction, persistence, retention rates, completion, and career outcomes (Kuh et al., 2008). Yet in hybrid learning environments blending physical classrooms with digital platforms maintaining this engagement across diverse touchpoints becomes increasingly complex and critically important, ensuring students remain motivated, connected, and productive regardless of modality.

1.4. The Present Study

Understanding the integration of generative AI and hybrid learning experiences in education is paramount, as these technologies redefine student engagement while presenting both opportunities and challenges for educators. This study addresses a critical gap in educational literature by examining how generative AI tutors affect student engagement in hybrid learning environments, providing a theoretical foundation that supports future research and practical applications. The rapid evolution of technology demands deeper understanding of how generative AI and hybrid learning can be harnessed to create seamless, effective learning journeys, enabling educators and institutions to better anticipate student needs and ultimately create more engaging and effective learning experiences.

2. Research Methodology

This study employs an exploratory review methodology (Arksey & O'Malley, 2005), guided by Batat (2024a) and popularized by Lim and Kumar (2024), to investigate generative AI's impact on student engagement in hybrid educational settings. Due to the scarcity of peer-reviewed literature on this emerging topic, it analyzes practice-based articles from EdTech companies, consulting firms, and institutions to capture real-world AI tutor implementations. The sensemaking approach (Weick, 1995) structures data interpretation, progressing from trend identification to meaning attribution and theoretical implications for learning behaviors across hybrid environments. This framework is ideal for bridging practitioner insights with theory amid rapid AI advancements.

3. Voices from Practice

Given that journal article searches on Scopus and Web of Science for empirical insights on the use of generative AI for student engagement, with and without consideration of hybrid learning environments, revealed limited results at the time of the study, thereby confirming the nascency of this area, this study opted to undertake a practice-based evidence review via an exploratory review of practice articles by established educational organisations identified through systematic searches. This study relied on a narrative review of practice articles published by reputable educational technology companies, research institutions, and professional organizations offering expert insights on AI implementation in education.

3.1. Khan Academy

Khan Academy, a leading non-profit educational platform serving millions globally, has developed Khanmigo, an AI-powered tutoring system that exemplifies generative AI's transformative potential in education. Khanmigo provides real-time, personalised feedback and adapts difficulty levels based on individual student performance across mathematics, science, and humanities. Early implementation data suggests students using Khanmigo demonstrate improved engagement metrics and learning outcomes, with some studies showing up to 30% improvement in concept mastery compared to traditional approaches. The platform employs Socratic questioning techniques, guiding students toward answers rather than providing solutions, thereby promoting deeper understanding and critical thinking. In hybrid learning contexts, students use Khanmigo for homework and self-paced learning at home, while teachers access detailed analytics dashboards in classrooms to identify struggling students and adjust instruction accordingly, exemplifying seamless integration across digital and physical environments. However, implementation challenges persist, including student over-reliance on AI assistance, bypassing deeper learning resources for quick answers. Additionally, ensuring culturally appropriate AI responses across diverse contexts requires ongoing monitoring, teachers need professional development to integrate AI insights effectively, and concerns about students using AI to complete assignments without genuine learning remain.

3.2. Microsoft Education

Microsoft Education, a global leader in educational technology, has integrated generative AI features across its learning platforms, providing personalised learning experiences, automating administrative tasks, and facilitating hybrid learning environments. Microsoft's approach emphasises AI as a collaborative partner rather than a replacement for human instruction. Implementation has shown promising results in supporting diverse learners; Reading Progress, powered by AI, provides immediate feedback on fluency and pronunciation while automatically generating personalised practice exercises. In hybrid classrooms, teachers use AI-generated insights to form differentiated instruction groups and provide targeted interventions during in-person sessions, while AI systems facilitate asynchronous learning by generating tailored study materials, practice questions, and learning pathways. However, significant challenges persist, including data privacy concerns regarding student information collection and ensuring equitable access to AI-powered tools across diverse socioeconomic contexts. Educators report initial resistance to AI integration, citing concerns about technology replacing teachers and steep learning curves. Technical issues such as integration complexity with existing school systems and ensuring consistent AI performance across different learning scenarios continue to require attention.

3.3. Coursera

Coursera, a massive open online course (MOOC) platform with over 100 million users globally, has integrated generative AI to enhance engagement and improve learning outcomes. Coursera's AI-powered tools provide personalised learning path recommendations, automated assessment feedback, and adaptive content delivery based on individual learner progress and preferences, scaling customised learning experiences impossible with human instructors alone, particularly in courses with tens of thousands of concurrent students. In hybrid contexts, universities use Coursera for blended learning, where students complete online modules with AI-guided support before participating in in-person seminars for deeper discussion and application. Coursera reports that AI-enhanced courses show improved completion rates and student satisfaction scores compared to traditional online courses, with immediate AI feedback helping students identify knowledge gaps and adjust learning strategies accordingly. However, ongoing challenges persist, including ensuring AI-generated feedback aligns with instructor pedagogical intentions and addressing cultural differences in learning preferences and communication styles. The platform continues balancing automation efficiency with meaningful human presence in education, while concerns about AI perpetuating assessment biases and potentially homogenising learning experiences across diverse global contexts remain areas of active research and refinement.

4. From Practice to Theory: Toward a Typology

The exploration of generative AI for student engagement in hybrid learning environments reveals a dual nature of transformative potential and significant challenges. A typology has been developed to categorise the bright and dark sides of generative AI and provide a comprehensive understanding of its impact on student engagement in hybrid contexts (Table 1). The typology is grounded in a cross-case synthesis using the sensemaking approach (Lim & Kumar, 2024), which involved scanning instances of both the bright and dark sides (trends), sensing and grouping them into five aspects (learning personalisation and engagement, teacher-AI collaboration and pedagogy, learning outcomes and academic integrity, equity and access, and data privacy and ethics), and substantiating each aspect by linking it to relevant educational theories and practical recommendations.

Aspect	Bright Side	Dark Side	Directions for Theory	Recommendations for Practice
Learning Personalization and Engagement	• AI adapts to individual learning pace • Real-time difficulty adjustment • 24/7 tutoring availability • Multimodal learning (text, video, interactive) • Progress tracking across online and classroom • Immediate feedback accelerates learning	• Creates filter bubbles limiting exposure • Over-scaffolding prevents productive struggle • Promotes passive learning • Engagement metrics may not equal deep learning • Students become dependent on AI guidance	• Apply Zone of Proximal Development (Vygotsky, 1978) to determine optimal AI scaffolding levels • Apply Self-Determination Theory (Deci & Ryan, 1985) to ensure AI enhances intrinsic motivation • Apply Engagement Theory (Fredricks et al., 2004) to distinguish behavioral, emotional, and cognitive engagement	• Design AI systems to promote productive struggle, not just comfort • Balance AI support with appropriate challenge • Measure deep learning outcomes, not just engagement metrics • Ensure AI recommendations expose students to diverse perspectives
Teacher-AI Collaboration and Pedagogy	• Automates routine tasks (grading, attendance) • Provides real-time data on student struggles • Enables differentiated instruction • Extends teacher reach in large classes • Seamless handoff: AI identifies gaps → teacher addresses in class	• Teachers feel de-skilled or replaceable • Loss of pedagogical autonomy • Technical learning curve for teachers • AI doesn't understand classroom dynamics • Quality control: AI gives wrong explanations • Context loss in AI-teacher transitions	• Apply TPACK Framework (Koehler & Mishra, 2009) for technology integration in teaching • Apply SAMR Model (Puentedura, 2006) to assess technology integration levels • Apply Distributed Cognition Theory to understand human-AI intelligence sharing	• Provide comprehensive professional development for teachers • Design AI as teacher assistant, not replacement • Ensure seamless AI-teacher handoffs in hybrid learning environments • Maintain teacher autonomy in pedagogical decisions
Learning Outcomes and Academic Integrity	• Improved test scores and retention • More practice opportunities • Immediate error correction • Mastery-based	• Students use AI to cheat/plagiarize • Erosion of critical thinking skills • Cannot distinguish student work from AI work	• Apply Bloom's Taxonomy to focus on higher-order thinking skills • Apply Constructivism (Piaget) to promote active knowledge	• Redesign assessments to minimize AI-assisted cheating • Teach AI literacy and ethical use • Focus on higher-order skills that AI cannot easily

MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1, Jan-June 2026, Pages: 708-715

	progression • Continuous assessment across hybrid learning touchpoints	• Learned helplessness (always asking AI) • Surface learning without deep understanding • Assessment validity concerns	construction • Apply Cognitive Load Theory to manage learning complexity • Apply Transfer of Learning Theory to ensure application in new contexts	replicate • Develop honor codes for appropriate AI use in learning
Equity, Access, and Digital Divide	• 24/7 availability democratizes access • Remote/rural students access quality tutoring • Reduces cost of private tutoring • Supports diverse learning needs (special education) • Multiple language support • Levels playing field for all students	• Requires reliable internet (digital divide) • Device access inequality • Digital literacy gaps • Disadvantages low-resource schools • May widen achievement gap • Cultural bias in AI responses • Language barriers (AI primarily English-focused)	• Apply Digital Divide Theory to understand access gaps • Apply Equity Theory (Adams) to ensure fair resource distribution • Apply Cultural Capital Theory (Bourdieu) to address advantage reproduction • Apply Universal Design for Learning (UDL) principles	• Provide device access and internet connectivity support • Design culturally responsive AI systems • Monitor equity metrics continuously • Ensure AI supports rather than replaces human connection in under-resourced settings
Data Privacy, Ethics, and Student Well-Being	• Predictive analytics identify at-risk students early • Personalized mental health support • Early intervention for learning difficulties • Monitors engagement patterns • Non-judgmental learning environment	• Student data privacy concerns • Surveillance and monitoring ethics • Consent issues (minors) • Data breaches expose sensitive information • Screen time and health concerns • AI dependency affects social-emotional development • Algorithmic bias in student assessments	• Apply Privacy Calculus Theory to balance benefits vs. privacy trade-offs • Apply Ethics of Care framework for responsibility and context • Apply Surveillance Theory to examine power and control • Apply Social-Emotional Learning (SEL) Framework	• Establish transparent data policies with clear governance • Obtain informed student/parent consent • Balance screen time with offline learning • Monitor student well-being indicators • Regular audits for algorithmic bias

4.1. Learning Personalisation and Engagement

Generative AI enables unprecedented personalisation in hybrid learning environments (Holmes et al., 2019), adapting content to individual learning pace, providing real-time difficulty adjustment, offering 24/7 tutoring availability, and delivering multimodal learning experiences. This addresses the longstanding challenge of accommodating diverse learner needs within constrained classroom time (Tomlinson, 2017). However, AI-driven personalisation can create filter bubbles where students only encounter content matching their current level (Bozdag, 2013), potentially preventing productive struggle necessary for deep learning (Kapur, 2016). Understanding these dynamics requires applying Vygotsky's Zone of Proximal Development theory (Vygotsky, 1978) to determine appropriate AI scaffolding levels and Self-Determination Theory (Ryan & Deci, 2000) to ensure AI personalisation enhances rather than undermines intrinsic motivation.

4.2. Teacher-AI Collaboration and Pedagogy

Generative AI significantly enhances teaching efficiency by automating routine tasks (Holmes et al., 2019), enabling teachers to focus on higher-order pedagogical activities. AI systems provide real-time data on student struggles (Pardo et al., 2019), enabling targeted interventions. However, concerns about teacher de-skilling (Selwyn, 2019) and loss of pedagogical autonomy emerge when AI systems make instructional decisions traditionally reserved for professional educators (Williamson, 2017). The TPACK framework (Koehler & Mishra, 2009) and SAMR model (Puentedura, 2006) provide guidance for appropriate technology integration that enhances rather than replaces teacher expertise.

4.3. Learning Outcomes and Academic Integrity

Generative AI tutors have demonstrated improved learning outcomes through immediate feedback (Hattie & Timperley, 2007), increased practice opportunities, and mastery-based progression. Meta-analyses suggest AI tutoring systems can improve student performance by 0.4 to 0.7 standard deviations (Kulik & Fletcher, 2016).

However, academic integrity concerns arise as students discover ways to use AI to complete assignments without genuine learning (Sullivan et al., 2023). Bloom's Taxonomy (Anderson & Krathwohl, 2001) and constructivist learning theory (Piaget, 1954) guide the design of assessments that promote higher-order thinking skills less susceptible to AI-assisted shortcuts, while fostering active knowledge construction.

4.4. Equity, Access, and Digital Divide

AI tutors offer the potential to democratise access to quality education (Reich & Ito, 2017), providing 24/7 support regardless of geographic location or socioeconomic status. Research suggests AI tutors can narrow achievement gaps when implemented with adequate support (Pane et al., 2017). However, the digital divide threatens to widen educational inequalities (Van Dijk, 2020), as students lacking devices or internet connectivity cannot benefit. Digital Divide Theory and Cultural Capital Theory inform strategies to ensure equitable access, while Universal Design for Learning principles guide the creation of AI systems that accommodate diverse learners.

4.5. Data Privacy, Ethics, and Student Well-Being

Generative AI enables early identification of at-risk students and personalised support for learning difficulties and well-being (Luckin & Cukurova, 2019), with learning analytics predicting student dropout with 70-90% accuracy (Hellas et al., 2018). However, concerns arise regarding student data privacy (Prinsloo & Slade, 2017), surveillance ethics (Williamson, 2017), and excessive screen time (Stiglic & Viner, 2019). Privacy Calculus Theory (Li, 2011) helps balance the benefits of data-driven insights against privacy risks, while the Ethics of Care framework (Noddings, 1984) and Social-Emotional Learning principles ensure AI systems support holistic student development without compromising well-being or autonomy.

5. Implications

This study's typology reveals that successful generative AI integration in hybrid learning depends on balancing five critical tensions: personalisation versus productive struggle, automation versus pedagogical autonomy, efficiency versus academic integrity, democratisation versus digital equity, and data utilisation versus privacy protection. Educational institutions must develop comprehensive implementation frameworks grounded in pedagogical theory rather than technological determinism (Holmes et al., 2019). Practitioners should employ the TPACK framework (Koehler & Mishra, 2009) to ensure AI enhances rather than replaces teacher expertise, while applying Universal Design for Learning principles to address equity concerns (van Dijk, 2020). Policymakers must establish ethical guidelines balancing data-driven insights against privacy risks (Prinsloo & Slade, 2017). Success requires strategic alignment between AI capabilities, pedagogical intentions, and institutional values, with continuous evaluation of impact on student engagement across behavioural, emotional, and cognitive dimensions.

6. Future Research

Future investigations should employ rigorous experimental designs comparing AI scaffolding levels against learning outcomes and authentic skill development (Kapur, 2016). Longitudinal studies must examine pedagogical identity transformations and professional autonomy as teachers collaborate with AI systems (Tondeur et al., 2017). Critical research priorities include developing assessment methodologies distinguishing genuine learning from AI-assisted performance (Cotton et al., 2023) and conducting cross-cultural studies examining differential impacts across socioeconomic contexts. Emerging agentic AI systems warrant particular attention, investigating appropriate autonomy levels, human oversight mechanisms, and ethical guardrails when AI agents autonomously orchestrate learning pathways and coordinate with educators (Russell & Norvig, 2021). Research must also address algorithmic bias, cultural responsiveness, and long-term effects on cognitive development and self-regulated learning capabilities.

7. Conclusion

This exploratory review reveals generative AI's paradoxical role in hybrid learning environments, simultaneously enhancing and threatening student engagement across behavioural, emotional, and cognitive dimensions. The developed typology demonstrates that AI integration creates value through personalisation, efficiency, and accessibility, yet risks filter bubbles, de-professionalisation, integrity erosion, inequity, and surveillance (Holmes et al., 2019; Selwyn, 2019). Success requires transcending technological solutionism, instead grounding implementation in robust pedagogical frameworks Vygotsky's ZPD, Self-Determination Theory, and constructivist principles while maintaining ethical vigilance. Institutions must strategically balance AI's scalability against human connection, data insights against privacy, and innovation against integrity. Those navigating these tensions through theoretically informed, ethically grounded approaches will cultivate hybrid learning ecosystems leveraging AI's transformative potential while preserving educational values, ultimately enhancing student engagement and success.

References

Anderson, L. W., & Krathwohl, D. R. (Eds.). (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. Longman.

Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. International Journal of Social Research Methodology, 8(1), 19-32.

Batat, W. (2024). Experiential marketing: Consumer behavior, customer experience and the 7Es. Routledge.

Bozdag, E. (2013). Bias in algorithmic filtering and personalization. Ethics and Information Technology, 15(3), 209-227.

Chua, K., & Islam, M. (2020). The hybrid Project-Based Learning–Flipped Classroom: A design project module redesigned to foster learning and engagement. International Journal of Mechanical Engineering Education, 49(4), 289–315. https://doi.org/10.1177/0306419019838335

Cotton, D. R. E., Cotton, P. A., & Shipway, J. R. (2023). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. Innovations in Education and Teaching International, 61(2), 228–239. https://doi.org/10.1080/14703297.2023.2190148

Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. Plenum.

Foster, D. (2022). Generative deep learning: Teaching machines to paint, write, compose, and play (2nd ed.). O'Reilly Media.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. Review of Educational Research, 74(1), 59-109.

Hattie, J., & Timperley, H. (2007). The power of feedback. Review of Educational Research, 77(1), 81-112.

Hellas, A., Ihantola, P., Petersen, A., Ajanovski, V. V., Gutica, M., Hynninen, T., Knutas, A., Leinonen, J., Messom, C., & Liao, S. N. (2018). Predicting academic performance: A systematic literature review. In Proceedings Companion of the 23rd Annual ACM Conference on Innovation and Technology in Computer Science Education (pp. 175-199).

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. Educause Review, 27, 1-12.

Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial intelligence in education: Promises and implications for teaching and learning. Center for Curriculum Redesign.

Kapur, M. (2016). Examining productive failure, productive success, unproductive failure, and unproductive success in learning. Educational Psychologist, 51(2), 289-299.

Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? Contemporary Issues in Technology and Teacher Education, 9(1), 60-70.

Kuh, G. D., Cruce, T. M., Shoup, R., Kinzie, J., & Gonyea, R. M. (2008). Unmasking the effects of student engagement on first-year college grades and persistence. The Journal of Higher Education, 79(5), 540–563. https://doi.org/10.1353/jhe.0.0019

Kulik, J. A., & Fletcher, J. D. (2016). Effectiveness of intelligent tutoring systems: A meta-analytic review. Review of Educational Research, 86(1), 42–78. https://doi.org/10.3102/0034654315581420

Li, Y. (2011). Empirical studies on online information privacy concerns: Literature review and an integrative framework. Communications of the Association for Information Systems, 28(1), 453-496.

Luckin, R., & Cukurova, M. (2019). Designing educational technologies in the age of AI: A learning sciences-driven approach. British Journal of Educational Technology, 50(6), 2824–2838. https://doi.org/10.1111/bjet.12861

Marr, B. (2023). Generative AI vs. traditional AI: What's the difference? Forbes.

Noddings, N. (1984). Caring: A feminine approach to ethics and moral education. University of California Press.

Pane, J. F., Steiner, E. D., Baird, M. D., Hamilton, L. S., & Pane, J. D. (2017). Informing progress: Insights on personalized learning implementation and effects. RAND Corporation. https://doi.org/10.7249/RR2042

Pardo, A., Jovanovic, J., Dawson, S., Gašević, D., & Mirriahi, N. (2019). Using learning analytics to scale the provision of personalised feedback. British Journal of Educational Technology, 50(1), 128–138. https://doi.org/10.1111/bjet.12592

Piaget, J. (1954). The construction of reality in the child. Basic Books.

Prinsloo, P., & Slade, S. (2017). Ethics and learning analytics: Charting the (un)charted. In C. Lang, G. Siemens, A. Wise, & D. Gašević (Eds.), Handbook of learning analytics (pp. 49-57). SOLAR.

Puentedura, R. R. (2006). Transformation, technology, and education. http://hippasus.com/resources/tte/

Raes, A., Detienne, L., Windey, I., & Depaepe, F. (2020). A systematic literature review on synchronous hybrid learning: Gaps identified. Learning Environments Research, 23(3), 269-290.

Reich, J., & Ito, M. (2017). From good intentions to real outcomes: Equity by design in learning technologies. DML Central.

Russell, S., & Norvig, P. (2021). Artificial intelligence: A modern approach (4th ed.). Pearson.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. American Psychologist, 55(1), 68-78.

Sarker, I. H. (2022). AI-based modeling: Techniques, applications and research issues towards automation, intelligent and smart systems. SN Computer Science, 3(2), Article 158. https://doi.org/10.1007/s42979-022-01043-x

Selwyn, N. (2019). Should robots replace teachers? AI and the future of education. Polity Press.

Stiglic, N., & Viner, R. M. (2019). Effects of screentime on the health and well-being of children and adolescents: A systematic review of reviews. BMJ Open, 9(1), Article e023191. https://doi.org/10.1136/bmjopen-2018-023191

Sullivan, M., Kelly, A., & McLaughlan, P. (2023). ChatGPT in higher education: Considerations for academic integrity and student learning. Journal of Applied Learning & Teaching, 6(1), 31–40. https://doi.org/10.37074/jalt.2023.6.1.17

Tomlinson, C. A. (2017). How to differentiate instruction in academically diverse classrooms (3rd ed.). ASCD.

Tondeur, J., Van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: A systematic review of qualitative evidence. Educational Technology Research and Development, 65(3), 555-575.

Van Dijk, J. A. G. M. (2020). The digital divide. Polity Press.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds.). Harvard University Press.

Weick, K. E. (1995). Sensemaking in organizations. Sage Publications.

Williamson, B. (2017). Big data in education: The digital future of learning, policy and practice. Sage Publications. https://doi.org/10.4135/9781529714920