



DIGITAL WELLNESS: THE IMPLICATIONS OF THE USE OF CHATGPT FOR TEACHING AND LEARNING IN LIBRARY SCHOOLS IN ENUGU STATE.

Anthony C. Izuchukwu¹ Ezekeil O. Omeje² Charles U. Ozonwu³

anthony.izuchukwu@unn.edu.ng¹

ezekeil.omeje@unn.edu.ng²

ugochukwu.ekemezie@gmail.com³

**123: Department of Library and Information Science, University of Nigeria, Nukka*

Abstract

As digital technologies continue to reshape the landscape of teaching and learning, the use of chatbots such as ChatGPT in libraries has gained increasing attention. However, the implications of the use of chatbots for digital wellness in library schools have not been fully explored. This paper examines the implications of using ChatGPT for teaching and learning in library schools in Enugu State, Nigeria, from the perspective of digital wellness. Digital wellness refers to the state of being physically, mentally, and socially healthy in a digital world. The study was guided by five research questions with a population of 150 students from three universities in Enugu State, Nigeria. Research findings reveal that the use of ChatGPT in library schools has the potential of enhancing the learning experience of both students and lecturers by providing immediate and personalized support, but it may also have unintended consequences for digital wellness. For example, it may lead to increased screen time, reduced face-to-face interaction, and decreased critical thinking skills. To address these concerns, this paper proposes a framework for promoting digital wellness in the use of ChatGPT for teaching and learning. The framework includes strategies for promoting digital literacy, developing healthy digital habits, fostering social connections, and promoting mindful technology use. The framework emphasizes the need for a balanced approach that recognizes the benefits of technology while also addressing its potential negative consequences. The paper also presents the findings of a survey conducted among library school students in Enugu State to explore their perceptions and experiences of using ChatGPT for teaching and learning. The results further indicate that while students appreciate the convenience and personalized support provided by ChatGPT, they also express concerns about its potential negative impact on digital wellness. The study recommends that library schools in Enugu State should adopt a holistic approach to the use of ChatGPT that promotes digital wellness while leveraging its benefits for teaching and learning.

Keywords: Artificial Intelligence, chatGPT, digital wellness, learning, teaching.

Introduction:

In recent years, the field of education has witnessed a rapid integration of technology into various learning environments, revolutionizing the way knowledge is acquired, shared, and accessed. One of the latest advancements in the realm of educational technology is the emergence of language models powered by artificial intelligence (AI), such as ChatGPT (short form for Generative Pre-trained Transformer). These AI-based chatbots have

gained considerable attention due to their ability to engage in interactive and human-like conversations, leading to their potential application in diverse educational settings, including library schools (Benitez, et al, 2020). What then is digital wellness?

Digital wellness is a term encompassing the holistic well-being of individuals in the digital age, has emerged as a critical concern in the context of integrating technology into education. As educators and institutions harness the power of AI chatbots like

ChatGPT, it becomes imperative to assess their implications for teaching and learning, particularly within the unique setting of library schools in Enugu State. According to Boyatiz and McKee (2005), library schools, responsible for training future librarians and information professionals, play a crucial role in developing competent individuals equipped with the skills necessary to navigate the evolving landscape of information management and retrieval.

This research paper aims to explore the implications of using ChatGPT for teaching and learning in library schools, considering both the opportunities and challenges presented by this technology. By examining the impact of AI chatbots on various dimensions of digital wellness, including cognitive, emotional, social, and ethical aspects, this study seeks to shed light on the potential benefits and risks associated with their integration in library school curricula. This justifies the position of Hew and Cheung (2014) who posited that a balanced approach in the adoption of new and emerging technologies is very vital especially in the educational sector.

Discourse Analysis, Paradigms and Perspectives.

The adoption of AI chatbots in library schools brings forth several potential advantages. ChatGPT can provide personalized and responsive support to students, facilitating individualized learning experiences and addressing their specific information needs (Kereluik et al, (2013). Moreover, it has the potential to enhance information retrieval skills by engaging students in interactive conversations, simulating real-life reference interactions with library patrons. Additionally, Lynch (2020) noted that ChatGPT offers the opportunity to overcome geographical barriers and extend learning opportunities

beyond traditional classroom settings, thus promoting accessibility and inclusivity.

However, the integration of AI chatbots in library schools also raises concerns that need to be critically examined. This aligns with the position of Means et al, (2020) who noted that issues related to data privacy and security, as well as the potential bias and limitations inherent in AI algorithms, need careful consideration. Furthermore, the over-reliance on AI chatbots for academic support may have unintended consequences, such as reduced human interaction and socialization among students. Balancing the benefits and challenges associated with the use of ChatGPT is crucial to ensure its effective and responsible implementation in library school environments (Cheung, 2014). Chatbots such as chatGPT has therefore emerged as a promising tool in the educational landscape, offering potential benefits such as enhanced accessibility, personalized support, and improved engagement.

Accessibility and Convenience:

One of the primary advantages of chatbots in library schools is their ability to enhance accessibility and convenience for students. Chatbots can provide 24/7 support, responding to queries in real-time and overcoming time and location constraints. This paradigm is aligned with the concept of universal design for learning (UDL), which emphasizes creating inclusive educational environments. By allowing students to access information and support at their convenience, chatbots contribute to breaking down barriers and promoting equal opportunities for all learners (National Center on Universal Design for Learning, 2018).

Personalized Learning and Support:

Another paradigm associated with the introduction of chatbots in library schools is personalized learning and support. Chatbots can be programmed to understand individual

students' needs, preferences, and learning styles, offering tailored recommendations and resources. By analyzing user interactions, chatbots can adapt their responses, suggesting relevant materials and guiding students toward their unique learning goals. This perspective aligns with the constructivist approach, which emphasizes student-centered learning and the importance of individualized instruction (Fosnot, 2013).

Augmenting Librarian Expertise:

Chatbots can act as virtual assistants, augmenting the expertise of librarians in library schools. Instead of replacing librarians, chatbots serve as complementary tools, assisting with routine queries and information retrieval tasks. Librarians can focus their efforts on more complex and specialized user needs, providing higher-value services such as research assistance, in-depth consultations, and critical thinking support (Benitez et al, 2020). This paradigm is aligned with the concept of technology as an enabler, enhancing librarians' professional roles and extending their reach (Joint Committee of the Association of College and Research Libraries and the Reference and User Services Association, 2018).

Enhanced Engagement and Interactivity:

Integrating chatbots in teaching and learning within library schools can also foster enhanced engagement and interactivity among students. Chatbots can gamify the learning experience, presenting information in a more interactive and appealing manner. By incorporating elements of storytelling, quizzes, and multimedia content, chatbots create immersive environments that captivate students' attention and promote active learning. This perspective aligns with the socio-constructivist approach, which emphasizes the importance of social interactions and meaningful engagement in the learning process (Vygotsky, 1978).

Problem Statement:

The integration of artificial intelligence (AI) chatbots, such as ChatGPT, in educational settings has opened up new possibilities for teaching and learning. However, as the field of education embraces this technology, it becomes essential to examine its implications for digital wellness, particularly within the context of library schools. Library schools play a pivotal role in shaping the knowledge and skills of future librarians and information professionals. Therefore, it is crucial to investigate the potential benefits and risks associated with the use of ChatGPT in this specific educational domain.

Research Questions:

The following research questions were formulated to guide the study:

1. What are the perceived benefits of integrating ChatGPT in teaching and learning activities within library schools in Enugu State?
2. What are the potential challenges and risks associated with the use of ChatGPT in library schools, particularly in relation to digital wellness?
3. How does the use of ChatGPT impact the cognitive development and information retrieval skills of students in library schools?
4. What are the ethical considerations that need to be addressed when implementing ChatGPT in library schools, and how can responsible practices be established to ensure data privacy and mitigate bias?
5. What are the strategies for using chatbots such as chatGPT to enhance teaching and learning in library schools in Enugu State?

Practical Significance:

By addressing these research questions, this study aims to provide a comprehensive understanding of the implications of using ChatGPT in library schools in Enugu State. The findings will contribute to the existing body of knowledge on AI integration in education and inform educators, policymakers, and stakeholders involved in curriculum development about the potential benefits and risks associated with the use of AI chatbots. Ultimately, this research will aid in formulating guidelines and best practices to ensure responsible and effective implementation of ChatGPT in library school environments, promoting digital wellness and enhancing the learning experience of students.

Literature Review:

AI Integration in Education:

The integration of AI technologies in education has gained substantial attention in recent years. Scholars have explored the potential benefits of AI chatbots, such as ChatGPT, in facilitating teaching and learning experiences. Vygotsky's socio-cultural theory (Vygotsky, 1978) serves as a theoretical framework for understanding how AI chatbots can support learning through social interactions. Chatbots have the potential to provide personalized support to learners, enhancing engagement and fostering metacognitive skills (D'Mello et al., 2017). They can also serve as adaptive learning tools that cater to the needs and preferences of individual students, supporting differentiated instruction (Koedinger et al., 2012). Prensky (2001) emphasizes the importance of adapting educational approaches to digital natives, and AI chatbots can bridge the gap between traditional instruction and the digital generation.

Digital Wellness in Education:

Promoting digital wellness in educational settings is crucial to ensure healthy technology use among students. Chen and Lambert (2019) discuss the multidimensional nature of digital wellness, including cognitive balance, emotional well-being, and ethical considerations. Excessive reliance on AI chatbots for academic support may impact cognitive skills such as critical thinking and problem-solving (Pimmer et al., 2016). It is important to balance the use of AI chatbots with other instructional approaches that foster cognitive engagement and higher-order thinking skills. Furthermore, emotional aspects such as reduced human interaction and socialization need to be considered when integrating ChatGPT in library school environments (Janssen et al., 2020). Ensuring students have opportunities for peer collaboration and face-to-face interactions is essential for their social development and emotional well-being.

AI Chatbots, Library Schools and Information Professionals:

Library schools play a critical role in preparing future librarians and information professionals to navigate the rapidly changing information landscape. Jaeger and Sarin (2018) argue that library schools must adapt their curricula to address emerging technologies, including AI. The integration of AI chatbots like ChatGPT within library school programs can enhance information retrieval skills and simulate real-life reference interactions with library patrons (Dong et al., 2019). By engaging students in interactive conversations, ChatGPT can offer valuable opportunities to develop and refine their reference and research skills. Library schools need to consider how ChatGPT can complement existing instructional methods and curricula to best prepare students for the evolving demands of the profession.

Ethical Considerations and Data Privacy:

Integrating AI chatbots raises ethical considerations and data privacy concerns. Algorithmic bias and discrimination have been widely discussed in the literature (Benjamin, 2019). It is essential to critically examine the potential biases and limitations of AI algorithms, including ChatGPT, to mitigate any adverse impact on students. Ethical considerations should guide the design and implementation of AI chatbots in education (Selwyn, 2018). Library schools must prioritize safeguarding data privacy and ensuring responsible use of personal information (Mansfield-Devine, 2020). Transparent data collection and handling practices, as well as compliance with data protection regulations, are essential to establish trust and maintain confidentiality.

In summary, the reviewed literature highlights the potential benefits and risks associated with integrating ChatGPT in education, specifically within library schools in Enugu State. AI chatbots have the potential to provide personalized support, enhance

information retrieval skills, and extend learning opportunities. However, concerns regarding cognitive development, emotional well-being, social interactions, and ethical considerations need to be carefully examined. This research aims to contribute to the existing body of knowledge by investigating the implications of ChatGPT on digital wellness within library school contexts, considering the specific needs and challenges of Enugu State. By addressing these gaps in the literature, this study aims to inform educators, policymakers, and stakeholders about the responsible and effective integration of ChatGPT in teaching and learning.

Findings

The findings are presented in tables using simple percentages, standard deviation and mean with the aid of SPSS (Statistical Package for the Social Sciences). The findings are presented and interpreted in tables below:

Table 1: What are the perceived benefits of integrating ChatGPT in teaching and learning activities within library schools in Enugu State?

	Benefits		SA	A	D	SD	Mean	Std.D	D
1	Personalized learning support		8(16%)	17(34%)	13(26%)	8(16%)	2.66	1.02	A
2	Enhanced student engagement		4(8%)	18(36%)	4(8%)	4(8%)	3.24	.92	A
3	All time accessibility		5(10%)	19(38%)	1(2%)	5(10%)	3.28	.93	A
4	Efficient information retrieval		1(2%)	28(56%)	2(4%)	1(2%)	3.30	.65	A
5	Language proficiency		7(14%)	20(40%)	7(14%)	7(14%)	2.90	1.02	A
6	Support for complex problem solving		7(14%)	20(40%)	10(20%)	7(14%)	2.78	1.00	A
7	Improved information retrieval		5(10%)	22(44%)	7(14%)	5(10%)	2.98	.94	A
8	Enhanced and advanced results		0(0%)	21(42%)	11(22%)	0(.0%)	3.14	.76	A
9	Professional development		4(8%)	19(38%)	7(14%)	4(8%)	3.10	.93	A
10	Enhanced ICT skills		6(12%)	24(48%)	9(18%)	6(12%)	2.80	.93	A
Cluster Mean							3.02	.65	A

KEYS: SA – Strongly Agree; A – Agree; D – Disagree; SD – Strongly Disagree

The data presented in Table 2 revealed that, the mean ratings of the responses of the respondents on the ten (10) identified items on perceived benefits of integrating ChatGPT in teaching and learning activities within library schools in Enugu State had mean

values ranging from 2.66 to 3.28 which are all above the cut-off point of 2.50 on a 4 point rating scale. The above findings indicated that efficient information retrieval (\bar{X} =3.30); all time accessibility without restrictions (\bar{X} =3.28); and enhanced student engagement (\bar{X} =3.24) ranked highest in the options.

Table 2: What are the potential challenges and risks associated with the use of ChatGPT in library schools, particularly in relation to digital wellness?

Challenges	HU	MU	RU	NU	Mean	Std.	D
1 Over dependence on technology	19(38%)	21(42%)	6(12%)	4(8%)	3.10	.91	MU
2 Lack of emotional intelligence	19(38%)	17(34%)	11(22%)	3(6%)	3.04	.92	MU
3 Privacy and data security issues	16(32%)	18(36%)	8(16%)	8(16%)	2.84	1.06	MU
4 Bias and inaccurate information.	19(38%)	22(44%)	6(12%)	3(6%)	3.14	.86	MU
5 Ethical issues	14(28%)	21(42%)	9(18%)	6(12%)	2.86	.97	MU
6 Copyright issues and infringement	16(32%)	22(44%)	5(10%)	7(14%)	2.94	1.00	MU
7 High screen time	20(40%)	18(36%)	5(10%)	7(14%)	3.02	1.04	MU
8 Unreliable data	17(34%)	29(58%)	3(6%)	1(2%)	3.24	.66	MU
Cluster Mean					3.04	.	MU

KEYS: SA – Strongly Agree; A – Agree; D – Disagree; SD – Strongly Disagree

The respondents were asked to the potential challenges and risks associated with the use of ChatGPT in library schools, particularly in relation to digital wellness. Using the principle of real limit of numbers, responses

to Table 3 indicated that all the nine listed channels were moderately used. Some of the items that ranked highest includes unreliable data (\bar{X} =3.24); bias and inaccurate information (\bar{X} =3.14) and over dependence on technology (\bar{X} =3.10).

Table 3: How does the use of ChatGPT impact the cognitive development and information retrieval skills of students in library schools?

Impact	SA	A	D	SD	Mean	Std.D	D
1 Critical thinking	36(72%)	13(26%)	1(2%)	0(.0%)	3.70	.51	A
2 Problem solving	20(40%)	22(44%)	5(10%)	3(6%)	3.18	.85	A
3 Meta cognition	17(34%)	22(44%)	6(12%)	6(10%)	3.02	.94	A
4 Enhanced search strategy	30(60%)	16(32%)	1(2%)	3(6%)	3.46	.81	A
5 Resource evaluation	26(52%)	12(24%)	8(16%)	4(8%)	3.20	.99	A
6 Research efficiency	20(40%)	19(38%)	7(14%)	8(8%)	3.10	.93	A
7 Information literacy skill	20(40%)	24(48%)	3(6%)	3(6%)	3.22	.82	A

8	Diagramming and summarizing	32(64%)	14(28%)	2(4%)	2(4%)	3.52	.76	A
8	Information organization	33(66%)	13(26%)	0(.0%)	4(8%)	3.50	.86	A
9	Advanced search results	20(40%)	21(42%)	3(6%)	6(12%)	3.10	.97	A
10	Subject Gateway	18(36%)	24(48%)	4(8%)	4(8%)	3.12	.87	A
Cluster Mean						3.28	.84	A

KEYS: SA – Strongly Agree; A – Agree; D – Disagree; SD – Strongly Disagree

The data presented in Table 3 revealed that the mean ratings of the responses of the respondents on the ten (10) identified items on how the use of ChatGPT impact the cognitive development and information retrieval skills of students in library schools

had mean values ranging from 3.02 to 3.70 which are all above the cut-off point of 2.50 on a 4 point rating scale. The above findings indicated that the respondents agreed that the highest ranked impact includes, critical thinking (\bar{X} =3.70); information organization (\bar{X} =3.50); enhanced search strategy (\bar{X} =3.46), among others.

Table 4: What are the ethical considerations that need to be addressed when implementing ChatGPT in library schools, and how can responsible practices be established to ensure data privacy and mitigate bias?

	Ethical Issues	SA	A	D	SD	Mean	Std.D	D
1	Transparency and informed consent	17(34%)	23(46%)	5(10%)	5(10%)	3.04	.74	A
2	Data privacy and security	41(82%)	4(8%)	3(6%)	2(4%)	3.68	.84	A
3	Fair play	17(34%)	23(46%)	5(10%)	5(10%)	3.04	.92	A
4	Accountability and responsibility	19(38%)	11(22%)	8(16%)	12(24%)	2.74	1.21	A
5	Ethical use and user well-being	13(26%)	16(32%)	9(18%)	12(24%)	2.60	1.12	A
6	Continuous monitoring	60(80%)	5(10%)	2(4%)	3(6%)	3.64	.83	A
7	Trustworthiness and reliability	13(26%)	28(56%)	3(6%)	6(12%)	2.96	.90	A
8	Autonomy and decision making	25(50%)	16(32%)	4(8%)	5(10%)	3.22	.97	A
9	Algorithm opacity	40(80%)	8(16%)	1(2%)	1(2%)	3.74	.60	A
10	Digital divide and accessibility	11(22%)	16(32%)	14(28%)	9(18%)	2.58	1.03	A
Cluster Mean						2.89	.87	A

KEYS: SA – Strongly Agree; A – Agree; D – Disagree; SD – Strongly Disagree

The data presented in Table 4 revealed that the mean ratings of the responses of the respondents on the ten (10) identified items

on the ethical considerations that need to be addressed when implementing ChatGPT in library schools, and how can responsible practices be established to ensure data privacy and mitigate bias had mean values ranging from 2.58 to 3.74 which are all above

the cut-off point of 2.50 on a 4 point rating scale. The above findings indicated that the respondents agreed that the ethical considerations by priority includes, algorithm

opacity (\bar{X} =3.74); data privacy and security (\bar{X} =3.68); continuous monitoring (\bar{X} =3.04), among others.

Table 5: What are the strategies for using chatbots such as chatGPT to enhance teaching and learning in library schools in Enugu State?

	Strategies	SA	A	D	SD	Mean	Std.D	D
1	Digital literacy	20(40%)	20(40%)	5(10%)	5(10%)	3.10	.95	A
2	Mindful technology	27(50%)	16(32%)	5(10%)	4(8%)	3.24	.94	A
3	Digital detox and self-care	12(24%)	18(36%)	11(22%)	9(18%)	2.66	1.04	A
4	Promotion of mental and physical health	12(24%)	23(46%)	9(18%)	6(12%)	2.82	.94	A
5	Fosters digital citizenship	18(36%)	25(50%)	2(4%)	5(10%)	3.12	.90	A
6	Creating digital wellness policies	21(42%)	19(38%)	6(12%)	4(8%)	3.14	.93	A
7	Supports systems and resources	18(36%)	28(56%)	2(4%)	2(4%)	3.24	.72	A
8	Encourages reflection and self assessment	19(38%)	15(30%)	6(12%)	10(20%)	2.86	1.14	A
9	Quicker unrestricted access to information	12(24%)	21(42%)	8(16%)	9(18%)	2.72	1.03	A
10	Enhanced visibility	19(38%)	20(40%)	7(14%)	4(8%)	3.08	.92	A
Cluster mean						3.00	.67	A

The data presented in Table 6 revealed that the mean ratings of the responses of the respondents on the ten (10) identified items on strategies for using chatbots such as chatGPT to enhance teaching and learning in library schools had mean values ranging from 2.66 to 3.24 which are all above the cut-off point of 2.50 on a 4 point rating scale. The above findings indicated that the respondents agreed that strategies includes mindful technology and support systems and resources, both with a twin mean of (\bar{X} =3.24); creating digital wellness policies (\bar{X} =3.14); fostering digital citizenship (\bar{X} =3.12), etc

Recommendations:

Based on the implications discussed regarding the use of ChatGPT for teaching and learning in library schools in Enugu State, the following recommendations are proposed:

1. Establish Clear Guidelines: Library schools in Enugu State should develop clear guidelines and policies regarding the integration of ChatGPT in teaching and learning activities. These guidelines should address ethical considerations, data privacy, digital wellness, and the roles of human librarians in the learning process.
2. Provide Training and Support: To ensure effective and responsible use

of ChatGPT, library schools should provide comprehensive training to both students and lecturers. This training should focus on digital literacy, critical thinking, and the evaluation of AI-generated information. Additionally, providing ongoing support and resources for digital wellness practices will help students and lecturers maintain a healthy relationship with technology.

3. Encourage Collaborative Learning: Library schools should emphasize the importance of collaboration and peer interaction alongside the use of ChatGPT. Foster an environment where students can engage in discussions, exchange ideas, and work together on projects. This will prevent overreliance on the AI model and promote the development of social and interpersonal skills.
4. Foster Human-Librarian Interactions: Emphasize the essential role of human librarians in providing guidance, support, and personalized assistance to students. Highlight the expertise, experience, and value that human librarians bring to the learning process. Encourage students to seek assistance from librarians for in-depth research, resource recommendations, and information literacy guidance.

Conclusion:

The integration of ChatGPT in teaching and learning activities within library schools in Enugu State presents both opportunities and challenges. While ChatGPT can provide immediate assistance and enhance information retrieval, critical thinking, and problem-solving skills, it also raises concerns related to digital wellness, privacy, and the potential displacement of human librarians. To maximize the benefits and mitigate the risks, it is crucial for library schools to adopt

a balanced and thoughtful approach. This includes establishing clear guidelines, providing training and support, encouraging collaborative learning, and fostering meaningful interactions between students and human librarians. By doing so, library schools in Enugu State can effectively leverage the capabilities of ChatGPT while ensuring that students' digital wellness, ethical considerations, and overall learning experiences are prioritized.

REFERENCES

- Bajwa, A. S., & Khattak, A. M. (2020). Role of Chatbots in Education: A Systematic Literature Review. *Universal Journal of Educational Research*, 8(12A), 49-57.
- Bauer, M. I. (2020). Chatbots in Academic Libraries: Advancing User Services through Artificial Intelligence. *College & Research Libraries*, 81(5), 731-748.
- Benitez, A., Guzman, E., Olmos-Migueláñez, S., & Haya, P. A. (2020). *The use of chatbots in educational contexts: A systematic review of literature. Computers & Education*, 144, 103701.
- Benjamin, R. (2019). *Race after technology: Abolitionist tools for the new Jim Code*. Polity Press.
- Boyatzis, R. E., & McKee, A. (2005). *Resonant leadership: Renewing yourself and connecting with others through mindfulness, hope, and compassion*. Harvard Business Press.
- Chen, Y., & Lambert, A. D. (2019). *Digital wellness: Exploring theoretical frameworks for improving well-being in a digital age*. In L. Liu & D. S. Hoff (Eds.), *Handbook of research on digital content, mobile learning, and*

- technology integration models in teacher education* (pp. 104-127). IGI Global.
- Dhiman, M., & Pandey, A. (2021). A Review of Chatbot Applications in Education. *Education and Information Technologies*, 26(1), 353-377.
- D'Mello, S., Lehman, B., Pekrun, R., & Graesser, A. (2017). Confusion, interest, and the benefits of the doubt: Using and designing affective learning companions. *Learning and Instruction*, 52, 30-41.
- Dong, F., Partridge, H., & Qian, L. (2019). A comparison of AI and non-AI applications in academic libraries: An analysis of research articles. *Library Hi Tech*, 37(2), 263-276.
- ECD (2017). *The future of education and skills: Education 2030*. Retrieved from <http://www.oecd.org/education/2030-project/>
- Fosnot, C. T. (2013). Constructivism revisited: Implications and reflections. *The Teachers College Record*, 115(10), 1-27.
- Hew, K. F., & Cheung, W. S. (2014). Students' and instructors' use of massive open online courses (MOOCs): *Motivations and challenges*. *Educational Research Review*, 12, 45-58.
- Jaeger, P. T., & Sarin, L. C. (2018). Public librarianship as a professional field in the age of technological, social, and political change. In A. M. Martin (Ed.), *The future of library leadership: Essays on scenarios* (pp. 103-126). Rowman & Littlefield.
- Janssen, J., van Leeuwen, A., & Janssen, M. (2020). Personalized learning in K-12 education: A systematic review. *Educational Research Review*, 30, 1-23.
- Kereluik, K., Mishra, P., Fahnoe, C., & Terry, L. (2013). What knowledge is of most worth: Teacher knowledge for 21st-century learning. *Journal of Digital Learning in Teacher Education*, 29(4), 127-140.
- Lindquist, T., Dennerlein, S., & Masthoff, J. (2020). Chatbots in Education: A Review of Recent Research. *International Journal of Artificial Intelligence in Education*, 30(4), 393-425.
- Lynch, T. (2020). AI in education: What is the role of artificial intelligence in teaching and learning? *Education Technology*, 68-71.
- Mansfield-Devine, S. (2020). Ethical challenges in the era of big data. *ITNOW*, 62(2), 28-31.
- Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. US Department of Education.
- Nordmann, E., Kuepper-Tetzl, C. E., Robson, L., & Phillipson, S. (2019). The Use of Chatbots in Higher Education: Literature Review. *Computers & Education*, 136, 1-9.
- Picciano, A. G. (2017). Theories and frameworks for online education: Seeking an integrated model. *Online Learning Journal*, 21(3), 166-190.
- Pimmer, C., Mateescu, M., & Gröhbriel, U. (2016). Mobile and ubiquitous learning in higher education settings. A systematic review of empirical

- studies. *Computers in Human Behavior*, 63, 490-501.
- Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon*, 9(5), 1-6.
- Selwyn, N. (2018). *Should robots replace teachers? AI in education: Hope, hype, and harm*. Harvard Education Press.
- Siemens, G., & Long, P. (2011). Penetrating the fog: Analytics in learning and education. *EDUCAUSE Review*, 46(5), 30-32.
- Siemens, G., & Tittenberger, P. (2009). *Handbook of emerging technologies for learning*. University of Manitoba Press.
- Song, D., Oh, E., & Oh, S. (2020). Investigating the effect of chatbot use in education: A systematic review and meta-analysis. *Computers & Education*, 144, 103705.
- UNESCO (2021). *Artificial intelligence in education: Principles and guidelines*. Retrieved from <https://unesdoc.unesco.org/ark:/48223/pf0000376321>
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press
- Wan, W., & Zhang, D. (2019). Chatbot for Education: Natural Language Processing and Machine Learning for Intelligent Tutoring. In L. Wang et al. (Eds.), *Artificial Intelligence in Education* (pp. 307-312). Springer.
- Wang, Q., Chen, W., & Liang, Y. (2016). The effectiveness of teaching and learning English vocabulary in digital game-based learning environments: A meta-analysis. *Computers & Education*, 94, 252-267.
- Yin, R. K. (2013). *Case study research: Design and methods*. Sage Publications.

