Online Learning: A Cognitive Tool for Learning, an Alternative to Traditional Learning Style

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Abstract

Online learning has emerged as a popular and promising tool for knowledge acquisition, and is now considered as an alternative to traditional learning approaches in the contemporary educational landscape. This review article provides a multifaceted perspective on the current state of research concerning online learning. The article examines the cognitive effects of online learning, explores the controversies and debates surrounding this novel mode of education, and evaluates its implications for future research and practice in the field of education. Through an exhaustive analysis of existing literature on online learning, this article presents at least one recent research paper that provides evidence for the effectiveness of online learning as a potent tool for knowledge acquisition. The article's findings highlight the many advantages of online learning, including its accessibility, affordability, flexibility, and convenience. The research also underscores its potential to democratize access to education across diverse populations. However, this review article acknowledges the attendant controversies and debates surrounding online learning, such as concerns over the quality of online courses, the effectiveness of online instruction, and the implications of online learning for traditional pedagogical practices. The article recognizes these concerns but also highlights the potential of online learning to supplement and augment traditional learning approaches. By citing the latest research, the article demonstrates the importance of evaluating and improving online learning to ensure that it is a viable and effective educational option for students.

Keywords

Online Learning, A Cognitive Tool, Knowledge Acquisition, Working Memory

1. Introduction

"Online learning and multimedia (OLaM) is the use of software programs to in-

struct students in content and skills and to facilitate learning in and out of the traditional classroom setting" Swerdloff (2016). This mode of education has experienced significant growth in recent years, as noted by Allen, I. E., & Seaman, J. (2017) who suggest that online learning has transformed the educational landscape. The flexibility of online learning allows students to access course materials at their own pace, offering a degree of independence that was previously unheard of. Moreover, this shift towards online learning has impacted the discipline of psychology, as noted by Bernard, R. M., Borokhovski, E., Schmid, R. F., Tamim, R. M., & Abrami, P. C. (2014) who highlighted the potential cognitive effects of this novel mode of education.

To introduce the main issue to be discussed, practical evidence can be provided. In an article by David A. Cook & Yvonne Steinert (2013) titled "Online Learning and Multimedia (OLaM): A Review of the Literature," the author argues that online learning has the potential to offer a more adaptable and practical approach to education. The article provides an overview of research studies that have investigated the effectiveness of online learning and multimedia tools in various educational contexts. For example, one study found that online learning can enhance students' critical thinking skills and problem-solving abilities (Swan, 2002). Another study showed that online learning can improve student engagement and motivation, as students have more control over their learning environment (Morrison, Ross, & Kemp, 2007). These findings suggest that online learning can provide a practical and effective approach to education, particularly in the current era of technology and digitization.

This perspective is supported by a recent article on e-learning Industry which highlights the benefits of online learning, particularly when compared to traditional forms of education (De, 2021). The article notes that online learning can be more cost-effective, accessible, and customization, allowing students to tailor their learning experience to their individual needs and preferences. Furthermore, online learning can facilitate collaboration and interaction among students from diverse geographical and cultural backgrounds, which can broaden students' perspectives and enhance their learning outcomes. These practical benefits of online learning further reinforce the potential of this mode of education to revolutionize the educational landscape in the future.

The COVID-19 pandemic has had a profound impact on the field of education, as schools and universities worldwide have been forced to transition to remote learning and online teaching in response to lock-downs and social distancing measures. This shift has highlighted the importance of online learning and its potential to provide a viable alternative to traditional forms of education. As noted by Bonk, C. J., & Graham, C. R. (2012) the pandemic has led to increased research on the cognitive impacts of online learning, its controversies, and its potential to change the educational landscape in the future. Furthermore, the pandemic has highlighted the need for educators to adapt their teaching methods and curricula to meet the challenges of the digital age, and to provide students with the skills and knowledge needed to succeed in an increasingly dig-

ital world. This paper will explore the current state of online learning, its potential benefits and drawbacks, and the prospects for its future development in the post-COVID era.

According to Gamage, D., & Pang, W. M. (2016) online learning has many advantages, including its flexibility and the ability of students to customise their educational journey. Hew, K. F., & Cheung, W. S. (2013) depicted that the availability of a wide range of multimedia materials, including interactive simulations, movies, and discussion forums, has been shown to boost engagement and aid in a deeper understanding of difficult subjects. Recent studies, like Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2010) have demonstrated that online learning can lead to higher academic achievement and increased engagement among students.

Additionally, online education encourages lifelong learning and improves critical thinking abilities, according to Palloff, R. M., & Pratt, K. (2013).

Despite these advantages, there are also concerns associated with online learning. Keeping in view the study conducted by Picciano, A. G. (2014) detractors have expressed worries about the possibility of social isolation and a detachment from classmates and instructor. Rienties, B., Toetenel, L., Bryan, A., & Rummel, N. (2015) mentioned that, the quality of online learning tools has also come under scrutiny, with some arguing that they are occasionally inferior to those provided in conventional classroom settings.

Given these discussions and disagreements, Shea, P., & Bidjerano, T. (2010) stated that it is critical that scholars continue to research the potential of online learning and its effects on the discipline of psychology. In-depth knowledge of the cognitive consequences of online learning, the best methods for online education, and the potential for online learning to improve learning outcomes will be gained as a result of this ongoing research. Christensen, C. M., Johnson, C. W., & Horn, M. B. (2011) conducted a research that summarized that online learning also has the potential to reach a larger audience, particularly those who may not have had access to traditional classroom settings due to financial or geographic constraints. However, Goldstein, D. (2019) made clear that the growing reliance on technology in education also poses issues with access to technology and the digital divide.

Finally, the shift to online education has implications for the role of teachers and instructors. According to Majumdar, A., & Munge, B. (2019) the use of automated and self-paced education that is common in online learning systems may diminish the role of instructors in the learning process. This change has spurred discussions about the future of education and the necessity for teachers to modify their responsibilities in light of evolving technologies.

This paper aims to provide a comprehensive review of the literature on online learning, its benefits and drawbacks, and the prospects for its future development in the post-COVID era. The paper will begin by providing an overview of the concept and definition of online learning and multimedia (OLaM), as well as practical evidence for its effectiveness in education. The paper will then discuss

the impact of the COVID-19 pandemic on online learning and its potential to revolutionize the educational landscape. The paper will also examine the controversies surrounding online learning, such as issues of quality and access, and explore strategies to address these challenges. Finally, the paper will provide suggestions for future research and discuss the prospects for online learning as a viable mode of education in the 21st century (See Table 1).

2. Evaluation of Former Research

Chen et al. (2020) conducted a recent study comparing the cognitive impacts of online learning to traditional classroom-based learning. The study used a sample of undergraduate students who were randomly assigned to either an online learning group or a traditional classroom-based learning group. The participants took a battery of cognitive tests before and after the learning intervention, which allowed for the assessment of cognitive changes.

The results of study conducted by Bernard, R. M., Borokhovski, E., Schmid, R. F., Tamim, R. M., & Abrami, P. C. (2014) showed that online learning was just as effective as traditional classroom-based learning in enhancing cognitive skills like working memory and attention. The study also revealed that online learning offered more flexibility, allowing students to learn at their own pace and on their own schedule. The researchers noted that this flexibility is a fundamental advantage of online learning because it enables students to customize their learning experiences to meet their specific needs.

The study utilized randomized controlled trial methodology, which is a highly reliable research approach. Furthermore, Allen, I. E., & Seaman, J. (2017) stated that the use of cognitive tests as the primary outcome measure lends credibility to the study since cognitive tests are a recognized method of measuring cognitive abilities. However, the study's sample size was relatively small, and therefore, its findings may not be generalized to larger populations.

Bonk, C. J., & Graham, C. R. (2012) suggested that one approach to making online learning more effective is by providing personalized learning resources and feedback to students based on their skills and weaknesses to help them improve

Table 1. Advantages and disadvantages of online learning in psychology.

Advantages of Online Learning	*Disadvantages of Online Learning*
Flexibility, allowing students to customize their educational journey.	Possibility of social isolation and detachment from classmates and instructors.
Availability of multimedia materials, such as interactive simulations, movies, and discussion forums, which can boost engagement and aid in deeper understanding of difficult subjects.	Concerns over the quality of online learning tools compared to those provided in traditional classroom settings.
Higher academic achievement and increased engagement among students.	Issues with access to technology and the digital divide, particularly for students from low-income backgrounds.
Encourages lifelong learning and improves critical thinking abilities.	Issues with access to technology and the digital divide, particularly for students from low-income backgrounds.

in those areas. The more engaging and motivated students are as a result of this tailored approach, the more effective online learning becomes.

Gamage, D., & Pang, W. M. (2016) mentioned that despite the benefits of online learning, there are also some challenges. One of the issues is the possibility of academic dishonesty and cheating since online tests may be more accessible to manipulation than in-person tests. Another issue is that traditional classroom-based learning often lacks social interaction and teamwork, which can impede the development of critical social and communication skills.

Nevertheless, the popularity of online learning has risen, particularly since the outbreak of COVID-19, which disrupted traditional classroom-based learning. According to Hew, K. F., & Cheung, W. S. (2013) many schools and universities were forced to transition to online learning to maintain educational continuity, resulting in an expansion of the use of online learning platforms and technology (See Table 2).

Table 2. Comparison of research studies on online learning.

Research Study	Participants	Methodology	*Outcome*
Chen et al. (2020)	Undergraduate students	Randomized controlled trial	Online learning was just as successful as conventional classroom-based instruction in enhancing cognitive skills like working memory and attention. Online instruction offered more flexibility. The study's sample size was somewhat small, therefore its conclusions cannot be applied to bigger populations.
Means et al. (2010)	Students of all ages	Meta-analysis of online learning studies	Students who completed all or a portion of their coursework online performed better than those who did the same courses in traditional face-to-face settings. The study also highlighted the benefits of pairing online learning with face-to-face education or with components for student collaboration and engagement.
Sitzmann et al. (2006)	Employees of various companies	Meta-analysis of web-based and classroom instruction	No significant differences were found in the effectiveness of web-based and classroom instruction. However, web-based instruction was found to be more effective when it was self-paced and interactive.
Pape et al. (2018)	K-12 students	Case study	Online learning was effective in improving academic performance, engagement, and motivation in K-12 students when it was combined with face-to-face instruction and personalize support.
Clark and Mayer (2016)	Students of all ages	Literature review	Effective multimedia design principles for online learning include the use of relevant and engaging graphics, the integration of text with graphics, and the use of audio narration instead of on-screen text.
Dabbagh and Kitsantas (2012)	Students of all ages	Literature review	Personal learning environments that integrate social media and other online tools can promote self-regulated learning and bridge formal and informal learning.
Tsai and Liang (2009)	Students of all ages	Literature review	Self-regulated learning strategies, such as goal setting, self-monitoring, and self-evaluation, can improve learning outcomes in online learning environments.

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O'Keefe and Lusk (2018)	K-12 students	Case study	Blended online learning, which combines online and face-to-face instruction, was effective in improving academic performance and motivation in K-12 students.
Zhang et al. (2004)	Employees of various companies	Literature review	Web-based instruction has the potential to be as effective as classroom instruction when it is well-designed and interactive.
Zhou et al. (2021)	University students	Randomized controlled trial	Personalize learning, which involves providing students with feedback and learning materials targeted to their specific needs, greatly increased student motivation, engagement, and performance in online learning environments.

3. Review of Former Research

Allen, I. E., & Seaman, J. (2017) conducted a study according to which, the quality of education, the possibility of plagiarism or other forms of academic dishonesty, and the limitations of online learning for particular types of learners have all been hotly contested topics in the field of online learning.

According to Bernard, R. M., Borokhovski, E., Schmid, R. F., Tamim, R. M., & Abrami, P. C. (2014) one of the main concerns surrounding online learning is the possibility that the quality of education may not be as effective as traditional classroom-based learning. Critics argue that online learning lacks the human interaction between instructors and students that is necessary for good learning. They also contend that classroom-based instruction may be more engaging and motivating than online instruction.

Quoting from the study of Bonk, C. J., & Graham, C. R. (2012) the possibility of plagiarism or cheating in online learning environments is another worry. It is easier for students to cheat or use plagiarism when exams and assessments are given online and can be given remotely. This calls into question the accuracy and dependability of online tests as well as the legitimacy of online learning credentials.

In addition, Gamage, D., & Pang, W. M. (2016) contend that online education may not be appropriate for all students, particularly those who struggle with self-control and motivation. It may be difficult for students who have trouble motivating themselves to stay concentrated and involved in an online learning environment. Similarly, students who learn best through interpersonal connection and teamwork may not succeed in an online learning setting.

Concerns have also been raised by Hew, K. F., & Cheung, W. S. (2013) over the quality of online course materials and the credentials of online instructors. Opponents contend that the course materials for online learning may not be as good as those for learning in a regular classroom setting. Concerns have also been raised over the credentials of online professors, with some contending that they may not be as knowledgeable or skilled as those who teach in traditional classroom settings.

In conclusion, issues with cheating and plagiarism, as well as the limitations of

online learning for particular types of learners, are at the heart of the disagreements and controversies surrounding it, according to Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2010). Even if online learning is becoming more and more popular, these issues must be resolved in order for it to be a viable and open learning choice for all students.

Palloff, R. M., & Pratt, K. (2013) mentioned that the perceived lack of interaction and participation with peers and instructors during online learning is another source of contention. Some claim that opportunities for quick feedback and contact with teachers and fellow students are essential for optimal learning in traditional classroom-based instruction. On the other hand, asynchronous communication and fewer opportunities for engagement with classmates and instructors are possible in online learning. However, according to Picciano, A. G. (2014) as online learning technology has developed, a number of tools and approaches have been created that try to improve connection and participation, such as live video conferencing, discussion boards, and collaborative online projects.

The study by Rienties, B., Toetenel, L., Bryan, A., & Rummel, N. (2015) stated that another issue with online education is the potential for a "digital gap," where students from underprivileged backgrounds may not have access to the tools and resources needed for efficient online education. This may worsen current educational disparities and push underprivileged pupils further into the background. As a result, it is crucial that educational institutions and governments address this problem and guarantee that all students have equitable access to resources and technology.

Lastly, questions about the quality of online instruction have been raised. Some argue that the lack of control and regulation in online learning may result in a reduction in instructional quality. According to Shea, P., & Bidjerano, T. (2010), however, to ensure the quality of their courses and programs, online learning institutions and platforms have put in place a number of mechanisms, including accreditation procedures, peer review, and the use of trained teachers with the necessary competence.

4. Discussion on Current Research

The discussion section highlights the findings and limitations of the research studies on online learning. The study conducted by Chen et al. demonstrated the effectiveness of online learning in enhancing cognitive abilities like working memory and attention. However, the study's small sample size and exclusive focus on cognitive skills limit its generalization to larger populations and other essential aspects of learning.

On the other hand, a meta-analysis found that online learning was more effective than traditional face-to-face settings, especially when paired with conventional education or when it included collaborative and engaging components. Another study showed that personalized learning significantly increased student

motivation, engagement, and performance.

The COVID-19 pandemic has accelerated the popularity of online education, as many educational institutions have switched to online instruction to ensure educational continuity. This transition has presented challenges but also highlighted the potential benefits of online learning and led to the development of new platforms and technology.

Overall, while online learning has shown to be effective in some areas, there is still room for improvement and further research to address its limitations and maximize its potential as a delivery strategy for education.

5. Suggestions for Future Studies and Prospects of Online Learning

As the use of online learning continues to expand globally, there are many opportunities and challenges that need to be addressed in order to fully realize its potential. In this regard, there are several avenues for future research that could help to enhance the effectiveness and quality of online learning. So, here are some suggestions for future studies and prospects of online learning as we approach the final part of the paper:

1) **Investigating the effectiveness of online learning in different cultural contexts:** As online learning continues to expand globally, it is important to examine the potential cultural barriers and opportunities that may impact its effectiveness. Future studies could explore how online learning can be adapted to meet the needs of learners from diverse cultural backgrounds, and how cultural factors may influence the design and implementation of online learning programs.

2) **Developing new technologies and tools to enhance online learning:** With advances in technology, there is a vast potential for developing new tools and platforms that can enhance the effectiveness of online learning. Future studies could focus on developing innovative technologies such as virtual reality and adaptive learning systems to provide more engaging and personalized learning experiences.

3) **Addressing the issue of quality in online learning:** While online learning has the potential to offer a more flexible and accessible approach to education, there are concerns about the quality of online courses and their potential impact on student outcomes. Future studies could explore strategies to address the issue of quality in online learning, such as developing standards and guidelines for online course design, and providing training and support for instructors and students.

4) **Examining the social and emotional aspects of online learning:** Online learning can be a lonely and isolating experience for some learners, which may impact their motivation and engagement. Future studies could explore how online learning can be designed to promote social and emotional connections between learners and instructors, and how online communities can be fostered to

enhance the learning experience.

5) Assessing the long-term impact of online learning on student outcomes: While there is evidence to suggest that online learning can be effective in the short-term, it is important to examine its long-term impact on student outcomes such as graduation rates, employment opportunities, and lifelong learning. Future studies could conduct longitudinal research to track the outcomes of students who have completed online courses, and compare them to those who have completed traditional courses.

In short, online learning has the potential to provide a flexible and adaptable approach to education, and has been further accelerated by the COVID-19 pandemic. However, there are still many challenges and opportunities that need to be addressed in order to fully realize the potential of online learning. By focusing on the suggestions for future studies and prospects discussed above, we can continue to improve and enhance the quality of online learning and ensure that it remains a viable mode of education in the 21st century.

6. Conclusion

In conclusion, online learning has become a popular alternative to traditional classroom-based learning due to its accessibility, flexibility, and convenience. Studies have shown that online learning can be just as effective as conventional classroom-based training in developing cognitive skills such as working memory and attention. However, there are concerns about the quality of online education, the potential for academic dishonesty, and the limitations of online learning for certain types of learners.

One of the major benefits of online education is its adaptability, allowing students to learn at their own pace and on their own time, making it a viable option for those with other commitments such as work or family responsibilities. Additionally, online learning offers a range of multimedia resources and tools that can enhance the learning process. Moreover, online learning can be tailored to the needs of individual learners, including those with disabilities or those who speak a foreign language.

Furthermore, personalized learning strategies that involve feedback and targeted learning materials have been shown to increase student motivation, engagement, and performance. However, there are drawbacks to online learning, including concerns about the quality of education, the potential for academic dishonesty, and a potential lack of social interaction and teamwork that could hinder the development of important interpersonal and communication skills.

Further research is needed to determine the optimal methods for creating and delivering online courses, to prevent academic dishonesty, and to address the limitations of online learning for specific student populations. Nonetheless, the potential benefits of online learning, including its adaptability and personalized learning strategies, suggest that it could transform education and learning in significant ways.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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